

## Q-FlexE<sup>™</sup> Dual IF/L-Band Satellite Modem With IP Encryption



#### **OVERVIEW**

The **Q-FlexE**<sup>™</sup> modem embodies a new concept in satellite modem technology - a *flexible software-defined modem* that does what you want, now and in the future.

The **Q-FlexE™** modem's *flexible hardware platform* provides IF and L-band operation in one unit, along with an advanced IP feature set that includes **AES-256 encryption**.

*Flexible pricing* is achieved by enabling only the features you need at any time. *Future-proofing* is assured by convenient software upgrades via Ethernet or a memory stick.

#### **Advanced Bandwidth-Efficient Features**

The **Q-FlexE<sup>™</sup>** modem supports the most powerful bandwidth-saving technology available.

**Paired Carrier™** overlays transmit and receive carriers reducing satellite bandwidth by 50% (using ViaSat's patented PCMA technology).

Both DVB-S2, renowned for its robustness and bandwidth efficiency, and its successor, **DVB-S2X** are supported.

**FastLink™** low-latency LDPC is optimised for latency-sensitive applications while giving coding gain that is close to the theoretical limits.

Bandwidth-saving IP features include acceleration and header and payload compression.

#### **FEATURES**

- Dual IF/L-band operation
- Data rates to 155Mbps
- XStream IP<sup>TM</sup> is an integrated suite of advanced IP optimization & traffic management features including TCP acceleration, header & payload compression, dynamic routing, traffic shaping, encryption & ACM
- ▶ DVB-S2X, FastLink™ LDPC & TPC
- Terrestrial interfaces include Ethernet & optical Ethernet, EIA-530, G.703, ASI, OC-3 & STM-1
- Optimized spectral roll-offs, including 5%
- ▶ Paired Carrier<sup>™</sup> carrier overlay
- ► LinkGuard<sup>™</sup> signal-under-carrier interference detection
- Built-in spectrum & constellation monitors
- New! DVB-S2X!
- New! DVB Carrier ID! Fully compliant with DVB-CID standard!
- New! Secure AAA RADIUS login using your normal company network login credentials!

#### **Applications**

- IP trunking and IP backhaul
- Corporate networking
- Mobile/G.703 backhaul
- Disaster recovery
- Maritime communications
- Satellite news gathering
- High-speed trains

**Request A Quote** 

## **Q-FlexE**<sup>™</sup>

#### Dual IF/L-Band Satellite Modem

| Main Spec             | Main Specifications   |  |  |  |  |  |
|-----------------------|---|--|--|--|--|--|
| Frequency             | IF: 50 to 90MHz & 100 to 180MHz<br>(resolution 100Hz) (BNC connector)<br>L-band: 950 to 2050MHz (resolution<br>100Hz) (N-type connector)<br>L-band option: Extends L-band opera-<br>tion to 2150MHz |  |  |  |  |  |
| Data Rate             | Operation to 2,048kbps provided as<br>standard<br>Extension options: 5Mbps, 10Mbps,<br>25Mbps, 60Mbps, 100Mbps and<br>155.52Mbps  |  |  |  |  |  |
| Data Rate<br>Limits   | DVB-S2X: 100kbps to 155.52Mbps<br>DVB-S2: 350kbps to 132Mbps<br>FastLink <sup>TM</sup> LDPC: 18kbps to 100Mbps<br>TPC: 4.8kbps to 60Mbps<br>1bps resolution   |  |  |  |  |  |
| Symbol Rate<br>Limits | DVB-S2X: 100ksps to 50Msps<br>DVB-S2: 350ksps to 37.5Msps<br>FastLink <sup>™</sup> LDPC: 18ksps to 40Msps<br>TPC: 9ksps to 40Msps   |  |  |  |  |  |
| Operating<br>Modes    | DVB-S2X (EN 302 307-2) option<br>DVB-S2 (EN 302 307-1) option<br>Closed Network (+ ESC) (IESS-315)<br>IBS/IDR (IESS-308/309/310/314) options  |  |  |  |  |  |
| Scrambling            | DVB-S2/DVB-S2X: As per EN 302 307<br>IBS: As per IESS-309<br>Closed Network + ESC: Synchronised<br>to ESC overhead  |  |  |  |  |  |
| Impedance             | <b>IF</b> : 50Ω/75Ω<br><b>L-band</b> : 50Ω  |  |  |  |  |  |
| Return Loss           | IF: 18dB typical<br>L-band: 14dB typical  |  |  |  |  |  |
| Redundancy            | 1:1 or up to 1:16 redundancy  |  |  |  |  |  |

#### **Traffic Interfaces**

Base modem (standard): Gigabit Ethernet (single RJ45) for IP traffic Traffic options: 4-port Gigabit Ethernet switch (extends base modem Ethernet traffic port with another 3 Ethernet ports, creating 4-port switch) Optical Gigabit Ethernet/STM-1/OC-3 (Small Form-Factor pluggable module) EIA-530 (RS422, X.21, V.35 and RS232 on 25-pin EIA-530 (RS422, X.21, V.35 and RS232 on 25-pin D-type female) G.703 E1/T1, E2/T2, E3/T3 (balanced on RJ45; unbalanced 75Ω BNC female) Quad E1 G.703 (balanced RJ45) Quad ASI (75Ω BNC female) Serial LVDS (25-pin D-type female) HSSI (50-pin HD SCSI-2 connector) IDR (to IESS 308; 50-way female D type connector) **Modulator** 

| modulator                          |   |
|------------------------------------|---|
| Output Power                       | IF: 0 to -25dBm (0.1dB steps)<br>L-band: 0 to -40dBm (0.1dB steps)                              |
| Output Power<br>Stability/Accuracy | Stability: ±0.5dB, 0°C to 50°C<br>Accuracy: ±0.375dBm   |
| Transmit Filter<br>Roll-off        | 5%, 10%, 15%, 20%, 25%, 35%   |
| Phase Accuracy                     | ±2° maximum   |
| Amplitude<br>Accuracy              | ±0.2dB maximum  |
| Carrier<br>Suppression             | -30dBc minimum  |
| Output<br>Phase Noise              | As EN 302 307 and IESS-316, nominally 3dB better  |
| Harmonics                          | Better than –55dBc/ 4kHz in band (at 0dBm to –30dBm output)                                     |
| Spurious                           | Better than –55dBc/ 4kHz in band (at<br>0dBm to –30dBm output)                                  |
| Transmit On/Off<br>Ratio           | 55dB minimum  |
| BUC PSU Option                     | 24V or 48V DC via IFL cable, 200W   |
| BUC 10MHz<br>Reference             | Via IFL cable; 10MHz ± 0.001 ppm;<br>3dBm ± 3dB   |
| FSK Control                        | Allows monitor & control of a compat-<br>ible L-band BUC from the modem via<br>the Tx IFL cable |

| Demodulator           Input Range         IF minimum:<br>-130 + 10 log (symbol rate)<br>IF/L-band maximum:<br>-80 + 10 log (symbol rate)           Maximum<br>Composite         +104Bm           Wanted-to-<br>composite         IF: -94 + 10 log (symbol rate)           Frequency         Up to 10Msps: ±1kHz to ±32kHz<br>(1kHz steps)           Acquisition         Dependent on FEC, data rate and<br>sweep width (at 9.6kbps, less than<br>1s at 6dB Es/No QPSK; at 10Mbps,<br>less than 100ms at 6dB Es/No QPSK)           Clock Tracking<br>Range         ±100pm minimum<br>att 00m sat 6dB Es/No QPSK; at 10Mbps,<br>less than 100ms at 6dB Es/No QPSK)           LNB 10MHz<br>Keferenc         5%, 10%, 15%, 20%, 25%, 35%           AGC Output         Buffered direct AGC output for<br>antenna peaking           LNB 10MHz<br>Keferenc         QPSK 114, 113, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45           DVB-S2X         QPSK 114, 113, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10,<br>23/26, 25/36, 13/18, 7/15, 8/15,<br>32/45           Portor DVB-S2         28/65, 3/5, 2/43, 3/4, 4/5, 5/6, 8/9, 9/10,<br>23/26, 25/36, 13/18, 7/15, 8/15,<br>32/45           DVB-S2X         Varise, 23/36, 25/36,<br>13/18, 7/19, 7/39, 4/3, 5/6           DVB-S2X         Varise, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 1/15, 7/9, 2/3           DVB-S2   | dem             |  |
|--|-----------------|--|
| -115 + 10 log (symbol rate)           L-band minimum:<br>-30 + 10 log (symbol rate)           Maximum<br>Composite         +10 dBm           Wanted-to-<br>composite         IF: -94 + 10 log (symbol rate)           Vanted-to-<br>composite         IF: -94 + 10 log (symbol rate)           Frequency<br>Sweep Width         Up to 10Msps: ±11klz to ±32kllz<br>(1klz steps)           Acquisition         Dependent on FEC, data rate and<br>sweep width (at 9.6kbps, less than<br>1s at 6dB Es/No QPSK, at 10Mbps,<br>less than 100ms at 6dB Es/No QPSK)           Clock Tracking<br>Range         5%, 10%, 15%, 20%, 25%, 35%           AGC Output         Buffered direct AGC output for<br>antenna peaking           LNB 10MHz<br>Reference         Via IFL cable; 10MHz ± 0.001 ppm;<br>0dBm ± 3dB           LNB Voltage         Selectable 13V, 15V, 18V or 24V DC to<br>LNB via IFL cable; maximum 0.5A           Forward Error Correction         DVS-S2<br>32/45           PSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>23/26, 25/36, 13/18, 7/15, 8/15, 23/25           Jack 5, 5/8, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15, 32/45           Jack 5, 5/8, 8/8, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15, 3/26,<br>28/5K 32/45           Jack 5, 5/8, 8/8, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 5/16, 8/9, 9/10,<br>23/26, 25/36, 6/3/18, 7/15, 8/15, 23/45           Jack 5, 5/2, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 3/24, 5/45, 8/24, 5/16, 8/9, 9/10,<br>32/45, 3/24, 5/11/5, 7/19, 4/25, 5/6,<br>13/18, 7/9, 7/79, 4/25, 5/6,<br>13/18, 7/9, 7/79, 4/  | Demodulate      | or                                     |
| L-band minimum:<br>-30 + 10 log (symbol rate)<br>IF/L-band maximum:<br>-80 + 10 log (symbol rate)           Maximum<br>Composite         F: -94 + 10 log (symbol rate)           Wanted-to-<br>composite         IF: -94 + 10 log (symbol rate)           Frequency<br>Sweep Width         Up to 10Msps: ±1KHz to ±32KHz<br>(1KHz steps)           Acquisition         Dependent on FEC, data rate and<br>sweep width (at 9.6kbps, less than<br>1s at 6dB Es/No QPSK; at 10Mbps,<br>less than 100ms at 6dB Es/No QPSK)           Clock Tracking<br>Range         ±100ppm minimum           Receive Filter<br>Receive Filter         5%, 10%, 15%, 20%, 25%, 35%<br>Roll-off           AGC Output         Buffered direct AGC output for<br>antenna peaking           LNB Voltage         Selectable 130, 15V, 18V or 24V DC to<br>LNB via IFL cable; 10MHz ± 0.001 ppm;<br>04Bm ± 3dB           LNB Voltage         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45           DVB-S2X         QPSK 134, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>56, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45           DVB-S2X         QPSK 13/4, 1/3, 2/5, 1/4, 8/15, 3/45,<br>32/45, 3/2, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 4/3, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 4/3, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 4/5, 5/6           DVB-S2X         QPSK 1/4, 1/3, 2/5, 1/2, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/   |                 | IF minimum:                            |
| -130 + 10 log (symbol rate)         IF/L-band maximum:<br>-80 + 10 log (symbol rate)         Wanted-to-<br>composite       IF: -94 + 10 log (symbol rate)         Vanted-to-<br>composite       IF: -94 + 10 log (symbol rate)         Frequency       Up to 10Msps: ±1kHz to ±32kHz<br>(1kHz steps)         Acquisition       Dependent on FEC, data rate and<br>sweep width (at 9.6kbps, less than<br>1s at 6dB Es/No QPSK; at 10Mbps,<br>less than 100ms at 6dB Es/No QPSK)         Clock Tracking<br>Range       ±100ppm minimum         Receive Filter<br>Roll-off       5%, 10%, 15%, 20%, 25%, 35%         AGC Output       Buffered direct AGC output for<br>antenna peaking         LNB 10MHz       Via IFL cable; 10MHz ± 0.001 ppm;<br>0dBm ± 3dB         LNB Voltage       Selectable 13N, 15V, 18V or 24V DC to<br>LNB via IFL cable; maximum 0.5A         Forward Error Correction       DVB-S2X         port for DVB-S2       32/45         abs yout 11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45         abs upport       23/26, 23/36, 13/18, 7/15, 8/15, 8/25,<br>32/45         bVB-S2X       Vers S2X 106, 5/6, 8/9, 9/10,<br>32/45, 31/17, 7/19, 2/3         bVB-S2X       Vers S2X 104, 4/5, 5/6, 8/9, 9/10,<br>32/45, 3/2, 4/4, 5/5, 6/8, 9/9, 9/10,<br>32/45, 3/2, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3         GPSK K14A, 1/3, 2/5, 1/15, 7/9, 2/3       64APSK 11/15, 7/9, 2/3         bVB-S2X       Vers S2X tow<br>Fratadise<br>proprietary       CPSK/BPSK16APSK/32/  |                 |  |
| -80 + 10 log (symbol rate)           Maximum<br>Composite         +10dBm           Wanted-to-<br>composite         IF: -94 + 10 log (symbol rate)           Frequency         L-band: -102 + 10 log (symbol rate)           Frequency         Uht2 steps)           Acquisition         Dependent on FEC, data rate and<br>sweep width (at 9.6kbps, less than<br>1s at 6dB Es/No QPSK; at 10Mbps,<br>less than 100ms at 6dB Es/No QPSK)           Clock Tracking<br>Range         5%, 10%, 15%, 20%, 25%, 35%           Roceive Filter<br>Roll-off         5%, 10%, 15%, 20%, 25%, 35%           AGC Output         Buffered direct AGC output for<br>antenna peaking           LNB 10MHz         Via IFL cable; 10MHz ± 0.001 ppm;<br>Reference           OdBm ± 3dB         Selectable 13V, 15V, 18V or 24V DC to<br>LNB via IFL cable; maximum 0.5A           DVB-S2X         OPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45           DVB-S2X         OPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10,<br>32/45, 13/18, 7/9, 770, 7/15, 8/15, 32/45           of DVB-S2 are<br>shown in italics         16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 4/5, 5/6           DVB-S2X Low-<br>tatency Mode         Very Short Frame; (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)           PSKABSK 11/15, 7/9, 4/5, 5/6         Very Short Frame; (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame) <tr< td=""><td></td><td>-130 + 10 log (symbol rate)</td></tr<>  |                 | -130 + 10 log (symbol rate)            |
| Maximum<br>Composite       +10dBm         Wanted-to-<br>composite       IF: 94 + 10 log (symbol rate)         Frequency       Up to 10Msps: ±10kHz to ±32kHz         Sweep Width       UkHz steps)         Above 10Msps: ±10kHz to ±250kHz       (10kHz steps)         Acquisition       Dependent on FEC, data rate and<br>sweep width (at 9.6kDps, less than<br>1s at 6dB Es/No QPSK, at 10Mbps,<br>less than 100ms at 6dB Es/No QPSK)         Clock Tracking<br>Range       #100ppm minimum         Range       ±100ppm minimum         Raceive Filter<br>Roll-off       5%, 10%, 15%, 20%, 25%, 35%         AGC Output       Buffered direct AGC output for<br>antenna peaking         LNB 10MHz       Via IFL cable; 10MHz ± 0.001 ppm;<br>Reference         0dBm ± 3dB       Selectable 13V, 15V, 18V or 24V DC to<br>LNB via IFL cable; maximum 0.5A         Port for DVB-S2         Port for DVB-S2X       QPSK 114, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>23/26, 25/36, 13/18, 7/15, 8/15,<br>22/45, 32/45         Rates support-<br>ed by DVB-S2X to<br>for DVB-S22 are<br>shown in italics       SetAfs, 23/4, 4/5, 5/6, 8/9, 9/10,<br>23/26, 25/36, 13/18, 7/15, 8/15, 22/45         DVB-S2X Low-<br>latency Mode       Very Short Frame: (Frame size of<br>5,400 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)         PASX2       Very Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)       GPSK/8PSK/16APSK/32APSK 1/3, 4/4, 5/6, 8/9, 9/10 <td></td> <td></td>   |                 |  |
| Composite         IF: -94 + 10 log (symbol rate)           Composite         L-banz: -102 + 10 log (symbol rate)           Frequency         Up to 10Msps: ±1kHz to ±32kHz<br>(1kHz steps)           Sweep Width         Dependent on FEC, data rate and<br>sweep width (at 9.6kbps, less than<br>1s at 6dB Es/No QPSK); at 10Mbps,<br>less than 100ms at 6dB Es/No QPSK)           Clock Tracking<br>Range         ±100ppm minimum           Receive Filter<br>Roll-off         5%, 10%, 15%, 20%, 25%, 35%           AGC Output         Buffered direct AGC output for<br>antenna peaking           LNB 10MHz         Via IFL cable; 10MHz ± 0.001 ppm;<br>0dBm ± 3dB           LNB Voltage         Selectable 13V, 15V, 18V or 24V DC to<br>LNB via IFL cable; maximum 0.5A           Forward Error Correction         DVB-S2X           DVB-S2X         4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45           rof DVB-S2         af5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45           rof DVB-S2X ref<br>shown in italics         13/18, 7/9, 7/79, 7/15, 8/15, 32/45           af45, 5/6, 8/9, 9/10,<br>32/45, 32/45         16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 32/45           PVB-S2X Low-<br>latency Mode         5/4, 4/0, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3           PAradise<br>proprietary         7/15, 8/15, 3/2, 3/3, 4/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 5/16, 8/9, 9/10           PSK/8PSK/16APSK/223, 3/4, 4/5, 5/6, 8/9, 9/10  | Maximum         |  |
| composite         L-band: -102 + 10 log (symbol rate)           Frequency<br>Sweep Width         Up to 10Msps: ±1kHz to ±32kHz<br>(10kHz steps)           Acquisition         Dependent on FEC, data rate and<br>sweep width (at 9.6kbps, less than<br>1s at 6dB Es/No QPSK; at 10Mbps,<br>less than 100ms at 6dB Es/No QPSK)           Clock Tracking<br>Range         ±100ppm minimum           Receive Filter<br>Roll-off         5%, 10%, 15%, 20%, 25%, 35%           AGC Output         Buffered direct AGC output for<br>antenna peaking           LNB 10MHz         Via IFL cable; 10MHz ± 0.001 ppm;<br>0dBm ± 3dB           LNB Voltage         Selectable 13V, 15V, 18V or 24V DC to<br>LNB via IFL cable; maximum 0.5A           Forward Error Correction         DVB-S2X           Jord SS2         QPSK 114, 173, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>20/45, 3/2, 24/5           DVB-S2X         QPSK 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>23/26, 25/36, 13/18, 7/15, 8/15,<br>24/45, 3/2, 24/45, 23/36, 25/36,<br>13/18, 7/9, 7/90, 7/15, 8/15, 32/45<br>32APSK 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3<br>64APSK 11/2, 7/9, 7/90, 7/15, 8/15, 3/2, 1/3, 3/4, 5/5<br>7/15, 8/15, 3/2       | Composite       |  |
| Frequency<br>Sweep Width         Up to 10Msps: ±1kHz to ±32kHz<br>(1kHz steps)           Acquisition<br>Time         Dependent on FEC, data rate and<br>sweep width (at 9.6kDs, less than<br>1s at 6dB Es/No QPSK); at 10Mbps,<br>less than 100ms at 6dB Es/No QPSK)           Clock Tracking<br>Range         ±100ppm minimum           Receive Filter<br>Roll-off         5%, 10%, 15%, 20%, 25%, 35%           AGC Output         Buffered direct AGC output for<br>antenna peaking           LNB 10MHz         Via IFL cable; 10MHz ± 0.001 ppm;<br>0dBm ± 3dB           LNB Voltage         Selectable 13V, 15V, 18V or 24V DC to<br>LNB via IFL cable; maximum 0.5A           Forward Error Correction         DVB-S2X           Includes sup-<br>port for DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45           BYK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10,<br>23/26, 25/36, 13/18, 7/15, 8/15, 32/45         32/45, 13/18, 7/15, 8/15,<br>32/45           BYK 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>23/26, 25/36, 13/18, 7/15, 8/15, 32/45         32/45, 13/18, 7/15, 8/15,<br>32/45           DVB-S2X Low-<br>latency Mode         Very Short Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)           Paradise<br>proprietary<br>extension to<br>DVB-S2X         Very Short Frame: (Frame size of<br>5,200 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)           DVB-S2X         Uitra Short Frame: (Frame size of<br>5,200 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)   |                 |  |
| Sweep Width         (1kHz steps)<br>Acouisition         (1kHz steps)           Acquisition         Dependent on FEC, data rate and<br>sweep width (at 9.6kbps, less than<br>1s at 6dB Es/No QPSK; at 10Mbps,<br>less than 100ms at 6dB Es/No QPSK)           Clock Tracking<br>Range         100ppm minimum           Receive Filter<br>Roll-off         5%, 10%, 15%, 20%, 25%, 35%           AGC Output         Buffered direct AGC output for<br>antenna peaking           LNB 10MHz         Via IFL cable; 10MHz ± 0.001 ppm;<br>0dBm ± 3dB           LNB voltage         Selectable 13V, 15V, 18V or 24V DC to<br>LNB voltage           DVB-S2X         0PSK 114, 113, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>20/245           Port for DVB-S2<br>at that are not part<br>of DVB-S2 are<br>shown in italics         0PSK 114, 173, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>22/26, 25/36, 13/18, 7/15, 8/15, 22/36,<br>13/18, 7/9, 77/90, 7/15, 8/15, 32/45           DVB-S2X Low-<br>latency Mode         16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 5/45, 23/36, 25/36, 25/36,<br>13/18, 7/9, 7/90, 7/15, 8/15, 32/45           Paradise<br>proprietary         VPS/SVL Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 2/5,<br>13/15, 14/15           DVB-S24         0PSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           PAradise<br>proprietary         QPSK/16APSK/32APSK 2/5,<br>13/15, 14/15           DVB-S2         QPSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 <td></td> <td></td>   |                 |  |
| Above 10Misps: ±10kHz to ±250kHz<br>(10kHz steps)           Acquisition<br>Time         Dependent on FEC, data rate and<br>sweep width (at 9.6kbps, less than<br>1s at 6dB Es/No QPSK; at 10Mbps,<br>less than 100ms at 6dB Es/No QPSK)           Clock Tracking<br>Range         ±100ppm minimum           Receive Filter<br>Roll-off         5%, 10%, 15%, 20%, 25%, 35%           AGC Output         Buffered direct AGC output for<br>antenna peaking           LNB 10MHz         Via IFL cable; 10MHz ± 0.001 ppm;<br>0dBm ± 3dB           LNB Voltage         Selectable 13V, 15V, 18V or 24V DC to<br>LNB via IFL cable; maximum 0.5A           Porward Error Correction         OPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10, 13/45, 9/20, 11/20, 11/45, 4/15, 14/45, 7/15, 8/15, 32/45, 32/45           DVB-S2X         MPSK 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10, 23/26, 25/36, 13/18, 7/15, 8/15, 23/45, 32/45,                      |                 |  |
| Acquisition<br>TimeDependent on FEC, data rate and<br>sweep width (at 9.6kbps, less than<br>1s at 6dB Es/No QPSK; at 10Mbps,<br>less than 100ms at 6dB Es/No QPSK)Clock Tracking<br>Range±100ppm minimum<br>at 6dB Es/No QPSK; at 10Mbps,<br>less than 100ms at 6dB Es/No QPSK;<br>AGC OutputReceive Filter<br>Roll-off5%, 10%, 15%, 20%, 25%, 35%<br>antenna peakingLNB 10MHz<br>ReferenceVia IFL cable; 10MHz ± 0.001 ppm;<br>odBm ± 3dBLNB VoltageSelectable 13V, 15V, 18V or 24V DC to<br>LNB via IFL cable; maximum 0.5ADVB-S2X<br>Includes support-<br>port for DVB-S2<br>that are not part<br>of DVB-S2X respective<br>shown in italics <b>OPSK</b> 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/4<br>5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45<br>32/45<br>SPK 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>23/26, 5/36, 13/18, 7/15, 8/15,<br>26/45, 3/24, 5/36, 8/9, 9/10,<br>23/26, 5/36, 13/18, 7/15, 8/15, 26/45, 3/24,<br>50, 8/9, 9/10, 13/45, 9/20,<br>13/18, 7/9, 77/90, 7/15, 8/15, 3/24,<br>53/245<br>53/245<br>54/45, 3/3, 4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3<br>64APSK 11/15, 7/9, 2/3<br>64APSK 11/15, 7/9, 4/5, 5/6DVB-S2X Low-<br>latency ModeVery Short Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)<br>Paradise<br>proprietary<br>extension to<br>DVB-S2XDVB-S2<br>Low-Latency<br>LDPCOPSK/0PSK 0.532, 0.639, 0.710,<br>0.778, 0.828, 0.886, 0.938, 0.940,<br>0.828, 0.886, 0.938, 0.940,<br>0.93<br>0PSK 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10FastLink™<br>Low-Latency<br>LDPCBPSK 5/16, 21/44, 3/4, 7/8,<br>0.93<br>16QAM 3/4, 7/8, 0.93<br>16QAM 3/4, 7/8, 0.93<br>16QAM   |                 |  |
| Timesweep width (at 9.6kbps, less than<br>1s at 6dB Es/No QPSK; at 10Mbps,<br>less than 100ms at 6dB Es/No QPSK)Clock Tracking<br>Range±100ppm minimumReceive Filter<br>Roll-off5%, 10%, 15%, 20%, 25%, 35%AGC OutputBuffered direct AGC output for<br>antenna peakingLNB 10MHzVia IFL cable; 10MHz ± 0.001 ppm;<br>0dBm ± 3dBLNB VoltageSelectable 13V, 15V, 18V or 24V DC to<br>LNB via IFL cable; maximum 0.5AForward Error CorrectionDVB-S2XOPSK 114, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45Jort for DVB-S2Port or DVB-S2Port or DVB-S2Port or DVB-S2Shown in italics32/45, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3GAPSK 213, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3GAPSK 213, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3GAPSK 21, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3GAPSK 21, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3GAPSK 21, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3GAPSK 21, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3GAPSK 21, 20/45, 3/2, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3DVB-S2 Low-<br>latency ModeParadise<br>proprietary<br>extension to<br>DVB-S2DVB-S2D   | Acquisition     |  |
| less than 100ms at 6dB Es/No QPSK)Clock Tracking<br>Range±100ppm minimumReceive Filter<br>Roll-off5%, 10%, 15%, 20%, 25%, 35%AGC OutputBuffered direct AGC output for<br>antenna peakingLNB 10MHz<br>ReferenceVia IFL cable; 10MHz ± 0.001 ppm;<br>0dBm ± 3dBLNB VoltageSelectable 13V, 15V, 18V or 24V DC to<br>LNB via IFL cable; maximum 0.5A <b>Forward Error Correction</b> DVB-S2X<br>port for DVB-S2 <b>OPSK</b> 114, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45, 23/45, 13/18, 7/15, 8/15,<br>26/45, 3/2, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/26, 25/36, 13/18, 7/15, 8/15, 26/45, 3/2, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/245, 11/15, 7/9, 2/3BVB-S2X<br>that are not part<br>of DVB-S2 are<br>shown in italicsVery Short Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)<br><b>QPSK/BPSK/16APSK/32APSK</b> 2/5,<br>7/15, 8/15, 3/2, 2/3, 11/15, 4/5,<br>13/15, 14/15DVB-S2XUtra Short Frame: (Frame size of<br>5,400 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)<br><b>QPSK/BPSK/16APSK/32APSK</b> 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9DVB-S2QPSK 114, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10<br>BPSK 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10FastLink™<br>Low-Latency<br>LDPCBPSK 0.499<br>QPSK/GOPSK 0.532, 0.639, 0.710,<br>0.798<br>BPSK/30AM 0.639, 0.710, 0.778<br>16APSK 114, 7/8, 0.93TPCBPSK 5/16, 21/44, 3/4, 7/8<br>QPSK/OQPSK 5/16, 21/44, 3/4, 7/8,<br>0.93OthersDVB-S2<br>Sequentia: BPSK/(Q)QPSK 1/2, 3/4,<br>7/8OthersDVB-SPSK 2/3<br>Sequentia: BPSK/(Q)QPSK 1/2, 3/4,<br>7/8   |                 |  |
| Clock Tracking<br>Range         ±100ppm minimum           Receive Filter<br>Roll-off         5%, 10%, 15%, 20%, 25%, 35%           AGC Output         Buffered direct AGC output for<br>antenna peaking           LNB 10MHz<br>Reference         0dBm ± 3dB           LNB Voltage         Selectable 13V, 15V, 18V or 24V DC to<br>LNB via IFL cable; maximum 0.5A           Forward Error Correction         DVB-S2X           DVB-S2X         OPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45           Pates support-<br>ed by DVB-S2X         OPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10,<br>23/26, 25/36, 13/18, 7/15, 8/15,<br>32/45           10VB-S2 are<br>shown in italics         13/18, 7/9, 77/90, 7/15, 8/15, 32/45           2445, 3/245         16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>22/45, 11/15, 7/9, 2/3           0DVB-S2 X Low-<br>latency Mode         Very Short Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 2/5,<br>7/15, 8/15, 3/5, 2/3, 11/15, 4/5,<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           BPSK 3/4, 7/15, 2/15, 3/4, 4/5, 5/6, 8/9, 9/10         SPSK 3/4, 7/18, 0.93           DVB-S2         QPSK/AQAM 0.639, 0.710, 0.778           16APSK 5/16, 21/44, 3/4, 7/8         QPSK/0QPSK 0.532, 0.639, 0.710,<br>0.798           BPSK 5/16, 21/44, 3/4, 7/8  |                 |  |
| Range         5%, 10%, 15%, 20%, 25%, 35%           Receive Filter<br>Roll-off         5%, 10%, 15%, 20%, 25%, 35%           AGC Output         Buffered direct AGC output for<br>antenna peaking           LNB 10MHz         Via IFL cable; 10MHz ± 0.001 ppm;<br>OdBm ± 3dB           LNB Voltage         Selectable 13V, 15V, 18V or 24V DC to<br>LNB via IFL cable; maximum 0.5A <b>Forward Error Correction</b> OPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45 <b>DVB-S2X OPSK</b> 1/4, 1/3, 2/5, 1/2, 3/4, 5/6, 8/9, 9/10,<br>23/26, 25/36, 13/18, 7/15, 8/15,<br>26/45, 32/45 <b>BPSK</b> 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>23/26, 25/36, 13/18, 7/15, 8/15, 26/45, 32/45<br>32/45, 3/2, 28/45, 23/36, 25/36,<br>13/18, 7/9, 77/90, 7/15, 8/15, 32/45<br>32/45 <b>DVB-S22 are</b><br>shown in italics <b>13/18</b> , 7/9, 7/90, 7/15, 8/15, 32/45<br>32/45K 11/15, 7/9, 2/3<br><b>64APSK</b> 11/15, 7/9, 2/3 <b>DVB-S2X Low-</b><br>latency Mode <b>Very Short Frame</b> : (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)<br><b>QPSK/6PSK/16APSK/32APSK</b> 2/5,<br>7/15, 8/15, 3/5, 2/3, 11/15, 4/5,<br>13/15, 14/15           DVB-S2X <b>Uitra Short Frame</b> : (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)<br><b>QPSK/8PSK/16APSK/32APSK</b> 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2 <b>QPSK 1/4</b> , 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           FastLink <sup>TM</sup> <b>BPSK</b> 0.639, 0.710, 0.778<br>16APSK/16APSK/23, 3/4, 4/5, 5/6, 8/9, 9/10           FastLink <sup></sup>   | Cleak Treaking  |  |
| Roll-off         AGC Output         Buffered direct AGC output for<br>antenna peaking           LNB 10MHz         Via IFL cable; 10MHz ± 0.001 ppm;<br>0dBm ± 3dB           LNB Voltage         Selectable 13V, 15V, 18V or 24V DC to<br>LNB via IFL cable; maximum 0.5A <b>Forward Error Correction</b> DVB-S2X <b>QPSK</b> 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45           Port for DVB-S2 <b>QPSK</b> 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45           Pates support-<br>ed by DVB-S22<br>that are not part<br>of DVB-S2 are<br>shown in italics <b>GAPSK</b> 1/4, 5, 5/6, 8/9, 9/10,<br>22/45, 3/2, 4/5, 5/36, 8/15, 32/2/5<br>32APSK 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 4/5, 5/6           DVB-S2X Low-<br>latency Mode <b>Very Short Frame</b> : (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)<br><b>QPSK/BPSK/16APSK/132APSK</b> 2/5,<br>7/15, 8/15, 3/5, 2/3, 11/15, 4/5,<br>13/15, 1/475           DVB-S2X<br>textension to<br>DVB-S2X <b>Uitra Short Frame</b> : (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)<br><b>QPSK/8PSK/16APSK/32APSK</b> 1/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           FastLink™<br>Low-Latency<br>LDPC <b>QPSK</b> 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           FastLink™<br>Low-Latency<br>LDPC <b>QPSK</b> 5/16, 21/44, 3/4, 7/8,<br>0.93           SPSK 3/2, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           FastLink™<br>Low-Latency<br>LDPC <b>QPSK</b> 5/16, 21/44, 3/4, 7/8,<br>0.93   |                 | ±100ppm minimum                        |
| AGC Output         Buffered direct AGC output for<br>antenna peaking           LNB 10MHz         Via IFL cable; 10MHz ± 0.001 ppm;<br>04Bm ± 3dB           LNB Voltage         Selectable 13V, 15V, 18V or 24V DC to<br>LNB via IFL cable; maximum 0.5A <b>Forward Error Correction</b> DVB-S2X <b>QPSK</b> 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45           Port for DVB-S2 <b>QPSK</b> 5, 2/3, 3/4, 5/6, 8/9, 9/10,<br>23/26, 25/36, 13/18, 7/15, 8/15,<br>32/45           Rates support-<br>ed by DVB-S22 are<br>shown in italics <b>16APSK</b> 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>26/45, 3/5, 28/45, 23/36, 25/36,<br>13/18, 7/9, 77/90, 7/15, 8/15, 32/45           DVB-S2X Low-<br>latency Mode <b>16APSK</b> 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 4/5, 5/6           DVB-S2X Low-<br>latency Mode <b>Very Short Frame</b> : (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame) <i>Paradise</i><br>proprietary<br>extension to<br>DVB-S2X <b>Utra Short Frame</b> : (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)           QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9         QPSK/0QPSK 0.532, 0.639, 0.710,<br>0.788           DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           BPSK 0.778, 0.828, 0.886, 0.938, 0.860,<br>0.938         0.861           LDPC         BPSK 0.778, 0.828, 0.886, 0.938, 0.800           S24PSK 0.778, 0.828, 0.886, 0.938, 0.800         0.93  |                 | 5%, 10%, 15%, 20%, 25%, 35%            |
| antenna peaking           LNB 10MHz<br>Reference         Via IFL cable; 10MHz ± 0.001 ppm;<br>0dBm ± 3dB           LNB Voltage         Selectable 13V, 15V, 18V or 24V DC to<br>LNB via IFL cable; maximum 0.5A           Forward Error Correction         DVB-S2X           DVB-S2X         QPSK 114, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45           Rates support-<br>ed by DVB-S22<br>that are not part<br>of DVB-S2 are<br>shown in italics         QPSK 13/8, 7/15, 8/15,<br>32/45           DVB-S2X tow-<br>latency Mode         Yery Short Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 2/5,<br>7/15, 8/15, 3/5, 2/3, 11/15, 4/5,<br>13/15, 14/15           DVB-S2X Low-<br>latency Mode         Very Short Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 2/5,<br>7/15, 8/15, 3/5, 2/3, 11/15, 4/5,<br>13/15, 14/15           DVB-S2X         Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           BPSK 0.499         QPSK/3PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         QPSK/0QPSK 0.532, 0.639, 0.710,<br>0.798           BPSK 0.499         QPSK/0QPSK 0.532, 0.639, 0.710,<br>0.798           Low-Latency<br>LDPC         BPSK 0.499           DVB-S2         BPSK 0.499     <  |                 | Buffered direct AGC output for         |
| Reference         0dBm ± 3dB           LNB Voltage         Selectable 13V, 15V, 18V or 24V DC to<br>LNB via IFL cable; maximum 0.5A           Forward Error Correction           DVB-S2X         QPSK 114, 113, 215, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45           Includes sup-<br>port for DVB-S2         QPSK 13, 178, 7/15, 8/15,<br>32/45           BPSK 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>23/26, 25/36, 13/18, 7/15, 8/15, 32/45           atare not part<br>of DVB-S2 are<br>shown in italics         16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>22/45, 13/18, 7/9, 77/90, 7/15, 8/15, 32/45           DVB-S2X Low-<br>latency Mode         Very Short Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 2/5,<br>7/15, 8/15, 3/5, 2/3, 11/15, 4/5,<br>13/15, 14/15           DVB-S2X         Utra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         QPSK 114, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           BPSK 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10         16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           FastLink™<br>Low-Latency<br>LDPC         BPSK 0.499           QPSK/0QPSK 0.532, 0.639, 0.710,<br>0.778         0.886, 0.938, 0.960           TPC         BPSK 5/16, 21/44, 3/4, 7/8<br>QPSK/0QPSK 5/16, 21/44,  |                 | antenna peaking                        |
| LNB Voltage         Selectable 13V, 15V, 18V or 24V DC to<br>LNB via IFL cable; maximum 0.5A           Forward Error Correction           DVB-S2X         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45           Pates support-<br>ed by DVB-S2X         QPSK 3/2, 2/3, 3/4, 5/6, 8/9, 9/10,<br>23/26, 25/36, 13/18, 7/15, 8/15,<br>32/45           Pates support-<br>ed by DVB-S2 are<br>shown in italics         16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3           DVB-S2 are<br>shown in italics         26/45, 3/2, 5/8, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3           DVB-S2X Low-<br>latency Mode         Very Short Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 2/5,<br>7/15, 8/15, 3/5, 2/3, 11/15, 4/5,<br>13/15, 14/15           DVB-S2X         Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           BPSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10         16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           IAPSK/0QPSK 0.532, 0.639, 0.710,<br>0.798         0.798           BPSK 0.499         QPSK/0QPSK 0.522, 0.639, 0.710,<br>0.798           DVB-S2         DVB-S2           DVB-S2         BPSK 5/16, 21/44, 3/4, 7/8,<br>0.93  |                 |  |
| LNB via IFL cable; maximum 0.5A           Forward Error Correction           DVB-S2X         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45           Pates suppor-<br>ed by DVB-S2X         BPSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10,<br>23/26, 25/36, 13/18, 7/15, 8/15,<br>32/45           Pates suppor-<br>ed by DVB-S2X         16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>22/26, 25/36, 13/18, 7/15, 8/15, 32/45           of DVB-S2 are<br>shown in italics         26/45, 3/2, 58/45, 23/36, 25/36,<br>13/18, 7/9, 77/90, 7/15, 8/15, 3/245           DVB-S2X Low-<br>latency Mode         Very Short Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)           PARMise         Utra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)           DVB-S2X         Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)           DVB-S2X         Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)           DVB-S2         QPSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         QPSK/0DPSK 0.532, 0.639, 0.710,<br>0.798           BPSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10           TAPSK/16QAM 0.639, 0.710, 0.778           16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           FastLink™         BPSK 5/16, 21/44, 3/4, 7/8<br>0.93           Low-Latency<br>LDPC         BPSK 5/16, 21/44, 3/4, 7/8<br>0.9   |                 |  |
| Forward Error Correction           DVB-S2X         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45           Bates support-<br>ed by DVB-S2X         BPSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10,<br>23/26, 25/36, 13/18, 7/15, 8/15, 32/45           That are not part<br>of DVB-S2 are<br>shown in italics         16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>26/45, 3/5, 28/45, 23/36, 25/36,<br>13/18, 7/9, 77/90, 7/15, 8/15, 32/45           DVB-S2X Low-<br>latency Mode         26/45, 3/5, 28/45, 23/36, 25/36,<br>13/18, 7/9, 77/90, 7/15, 8/15, 32/45           Paradise<br>proprietary<br>extension to<br>DVB-S2X Low-<br>latency Mode         Very Short Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)           QPSK/8PSK/16APSK/32APSK 2/5,<br>7/15, 8/15, 3/5, 2/3, 11/15, 4/5,<br>extension to<br>DVB-S2X         Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)           QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9         Ultra Short Frame; (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)           QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9         DVB-S2           DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           FastLink™<br>Low-Latency<br>LDPC         BPSK 0.778, 0.828, 0.836, 0.938,<br>64QAM 0.828, 0.886, 0.93 | LIND VOILage    |  |
| DVB-S2X         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45           Brsk 3/5, 2/3, 3/4, 5/6, 8/9, 9/10,<br>23/26, 25/36, 13/18, 7/15, 8/15,<br>26/45, 32/45         32/45           Brsk 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>23/26, 25/36, 13/18, 7/15, 8/15, 32/45         32/45,<br>26/45, 32/45           shown in italics         16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3<br>64APSK 11/15, 7/9, 2/3           DVB-S2X Low-<br>latency Mode         Very Short Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)           Paradise<br>proprietary<br>extension to<br>DVB-S2X         Very Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)           QPSK/8PSK/16APSK/32APSK 2/5,<br>7/15, 8/15, 3/5, 2/3, 11/15, 4/5,<br>13/15, 14/15         Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)           QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9         QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           FastLink™<br>LDPC         BPSK 0.778, 0.828, 0.838, 0.960           TFC         BPSK 0.778, 0.828, 0.886, 0.938<br>64QAM 0.828, 0.886, 0.938, 0.960           TPC         BPSK 5/16, 21/44, 3/4, 7/8<br>0.93           0APSK/16QAM 0.726, 0.778, 0.828, 0.861, 0.93           0APSK/0QPSK 5/16, 21/44, 3/4, 7/8<br>0.93           0PSK-S/16QAM 0.726, 0.93  |                 |  |
| 4/5, 5/6, 8/9, 9/10, 13/45, 9/20,<br>11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45         Port for DVB-S2<br>ed by DVB-S2X<br>that are not part<br>of DVB-S2 are<br>shown in italics       398, 3/4, 5/6, 8/9, 9/10,<br>23/26, 25/36, 13/18, 7/15, 8/15,<br>26/45, 3/2, 28/45, 23/36, 25/36,<br>13/18, 7/9, 77/90, 7/15, 8/15, 32/45         DVB-S2X tow-<br>latency Mode       16APSK 21/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3         Paradise<br>proprietary<br>extension to<br>DVB-S2X       Very Short Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 2/5,<br>7/15, 8/15, 3/5, 2/3, 11/15, 4/5,<br>13/15, 14/15         DVB-S2X       Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9         DVB-S2       QPSK 1/14, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10         BPSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10       8PSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10         FastLink™<br>LOPC       BPSK 0.499         QPSK//0QPSK 0.532, 0.639, 0.710,<br>0.738       0.738, 0.886, 0.938, 0.960         TPC       BPSK 0.778, 0.828, 0.886, 0.938, 0.960         TPC       BPSK 5/16, 21/44, 3/4, 7/8<br>0.93         0PSK/0QPSK 5/16, 21/44, 3/4, 7/8<br>0.93       0.92         0PSK/0QPSK 5/16, 21/44, 3/4, 7/8       0.93   |                 |  |
| Includes sup-<br>port for DVB-S2         11/20, 11/45, 4/15, 14/45, 7/15, 8/15,<br>32/45           Rates support-<br>ed by DVB-S2X         8PSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10,<br>23/26, 25/36, 13/18, 7/15, 8/15, 22/45,<br>32/45, 32/45           16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3         16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3           0 DVB-S2X Low-<br>latency Mode         26/45, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3           Paradise<br>proprietary<br>extension to         Very Short Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)           QPSK/8PSK/16APSK/32APSK 2/5,<br>7/15, 8/15, 3/5, 2/3, 11/15, 4/5,<br>13/15, 14/15         Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)           QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9         Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)           QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9         Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)           QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9         DVB-S2           DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           FastLink™         BPSK 0.499           Low-Latency<br>LDPC         QPSK/0QPSK 0.532, 0.639, 0.710,<br>0.778           BASK 0.499         QPSK/0QPSK 0.0778, 0.828,<br>0.8861           32APSK 0.778, 0.828, 0.886, 0.938   | DVB-S2X         |  |
| port for DVB-S2         32/45           Rates support-<br>ed by DVB-S2X<br>that are not part         26/25/36, 13/18, 7/15, 8/15,<br>26/45, 32/45           that are not part         16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>26/45, 3/5, 28/45, 23/36, 25/36,<br>32APSK 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3           DVB-S2 are<br>shown in italics         32APSK 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3           DVB-S2X Low-<br>latency Mode         Very Short Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)           Paradise<br>proprietary<br>extension to<br>DVB-S2X         Very Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)           QPSK/BPSK/16APSK/32APSK 2/5,<br>7/15, 8/15, 3/5, 2/3, 11/15, 4/5,<br>13/15, 14/15         Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)           QPSK/BPSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9         USB-S2           DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           BPSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10         16APSK 2/3, 3/4, 5/6, 8/9, 9/10           FastLink™         BPSK 0.499           Low-Latency<br>LDPC         BPSK 0.499           DVB-S2         QPSK/0QPSK 0.532, 0.639, 0.710,<br>0.788           32APSK 0.778, 0.828, 0.886, 0.938           64QAM 0.828, 0.886, 0.938, 0.960           TPC         BPSK 5/16, 21/44, 3/4, 7/8           QPSK/0QPSK 5/16, 21/44, 3/4, 7/8,  | Includes sup-   |  |
| Rates support-<br>ed by DVB-S2X         23/26, 25/36, 13/18, 7/15, 8/15,<br>26/45, 32/45           that are not part<br>of DVB-S2 are<br>shown in italics         16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3           64APSK 11/15, 7/9, 7/790, 7/15, 8/15, 32/45         32APSK 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3           64APSK 11/15, 7/9, 2/3         64APSK 11/15, 7/9, 2/3           64APSK 11/15, 7/9, 2/3         64APSK 11/15, 7/9, 2/3           64APSK 11/15, 7/9, 2/3         64APSK 11/15, 7/9, 2/3           Paradise<br>proprietary<br>extension to<br>DVB-S2X         Very Short Frame: (Frame size of<br>3,240 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 2/5,<br>7/15, 8/15, 3/5, 2/3, 11/15, 4/5,<br>13/15, 14/15           DVB-S2X         Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         QPSK 11/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           BPSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10         8PSK/36QAM 0.639, 0.710, 0.778           LOPC         QPSK/0QPSK 0.532, 0.639, 0.710,<br>0.798           BPSK 0.499         QPSK/0QPSK 0.532, 0.639, 0.710,<br>0.798           BPSK 0.778, 0.828, 0.886, 0.938,<br>0.960           TPC         BPSK 5/16, 21/44, 3/4, 7/8<br>QPSK/0QPSK 5/16, 21/44, 3/4, 7/8<br>QPSK/0QPSK 5/16, 21/44, 3/4, 7/8<br>QPSK/0QPSK 5/16, 21/44, 3/4, 7/8,<br>0.93           Others         DVB-S: QPSK 1/2, 2/3, 3/4, 5/6<br>DVB-DSNG: 8PSK 2/3, 5/6, 8/9;<br>16QAM  | port for DVB-S2 |  |
| ed by DVB-S2X<br>that are not part<br>of DVB-S2 are<br>shown in italics         26/45, 32/45           13/B, 7/9, 77/90, 7/15, 8/15, 32/45           32APSK 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3           64APSK 11/15, 7/9, 4/5, 5/6           DVB-S2X Low-<br>latency Mode           Paradise<br>proprietary<br>extension to<br>DVB-S2X           DVB-S2X Low-<br>latency Mode           Paradise<br>proprietary<br>extension to<br>DVB-S2X           DVB-S2X           UItra Short Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 2/5,<br>13/15, 14/15           DVB-S2X           UItra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2           QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2           QPSK/0PSK 1/2, 3/4, 5/6, 8/9, 9/10           16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           FastLink™           Low-Latency<br>LDPC           DVB-S2           QPSK/0QPSK 0.532, 0.639, 0.710, 0.778           16APSK 2/3, 0.886, 0.938           64QAM 0.828, 0.886, 0.938, 0.960           TPC         BPSK 5/16, 21/44, 3/4, 7/8           QPSK/0QPSK 5/16, 21/44, 3/4, 7/8           QPSK/0QPSK 5/16, 21/44, 3/4, 7/8 <td>Rates support-</td> <td></td>  | Rates support-  |  |
| of DVB-S2 are<br>shown in italics         26/45, 3/5, 28/45, 23/36, 25/36,<br>13/18, 7/9, 77/90, 7/15, 8/15, 32/45           32APSK 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3         64APSK 11/15, 7/9, 2/3           64APSK 11/15, 7/9, 2/3         64APSK 11/15, 7/9, 2/3           64APSK 11/15, 7/9, 2/3         64APSK 11/15, 7/9, 2/3           64APSK 11/15, 7/9, 2/3         64APSK 11/15, 7/9, 2/3           1atency Mode         Very Short Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)           Paradise<br>proprietary<br>extension to<br>DVB-S2X         0PSK/8PSK/16APSK/32APSK 2/5,<br>7/15, 8/15, 3/5, 2/3, 11/15, 4/5,<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)           DVB-S2         0PSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         0PSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           FastLink™         BPSK 0,499           Low-Latency<br>LDPC         0PSK/0QPSK 0.532, 0.639, 0.710,<br>0.798           BPSK 0,778, 0.828, 0.886, 0.938<br>64QAM 0.828, 0.886, 0.938, 0.960           TPC         BPSK 5/16, 21/44, 3/4, 7/8<br>0.93           3PSK 5/16, 21/44, 3/4, 7/8           0PSK/0QPSK 5/16, 21/44, 3/4, 7/8, 0.93           16QAM 3/4, 7/8, 0.93           Others         0VB-SS (2PSK 1/2, 3/4, 5/6, 8/9;<br>16QAM 3/4, 7/8           0VB-SNG: 8PSK 2/3, 5/6, 8/9;<br>16QAM 3/4, 7/8           0VB-SSNG: 8PSK 2/3, 5/6, 8/9;<br>16QAM 3/4, 7/8 <td>ed by DVB-S2X</td> <td>26/45, 32/45</td>   | ed by DVB-S2X   | 26/45, 32/45                           |
| shown in italics         13/18, 7/9, 77/90, 7/15, 8/15, 32/45           32APSK 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3         64APSK 11/15, 7/9, 2/3           64APSK 11/15, 7/9, 2/3         64APSK 11/15, 7/9, 2/3           DVB-S2X Low-<br>latency Mode         Very Short Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)           Paradise<br>proprietary<br>extension to<br>DVB-S2X         QPSK/8PSK/16APSK/32APSK 2/5,<br>13/15, 14/15           Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)           QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           BPSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10         8PSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           IAPSK /26APSK 0.532, 0.639, 0.710,<br>0.798         0.798           BPSK 0.499         QPSK/0QPSK 0.532, 0.639, 0.710,<br>0.778, 0.828, 0.886, 0.938,<br>0.851           32APSK 0.778, 0.828, 0.886, 0.938,<br>64QAM 0.828, 0.886, 0.938, 0.960           TPC         BPSK 5/16, 21/44, 3/4, 7/8<br>QPSK/0QPSK 5/16, 21/44, 3/4, 7/8           DVB-S2         DVB-S2           Others         DVB-S1(2, 2/3, 3/4, 5/6<br>DVB-DSNG: 8PSK 2/3, 5/6, 8/9;<br>16QAM 3/4, 7/8           Others         DVB-SNG: 8PSK 2/3<br>Sequential: BPSK/(O)QPSK 1/2, 3/4,<br>7/8           Reed-Solomon outer codec available  |                 |  |
| 32APSK 3/4, 4/5, 5/6, 8/9, 9/10,<br>32/45, 11/15, 7/9, 2/3<br>64APSK 11/15, 7/9, 4/5, 5/6           DVB-S2X Low-<br>latency Mode         Very Short Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 2/5,<br>7/15, 8/15, 3/5, 2/3, 11/15, 4/5,<br>13/15, 14/15           DVB-S2X         Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           BPSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10         16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           IAPSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10         16APSK/16QAM 0.639, 0.710, 0.778           Low-Latency<br>LDPC         BPSK 0.499           QPSK/0QPSK 0.532, 0.639, 0.710, 0.778         16APSK/16QAM 0.726, 0.778, 0.828, 0.886, 0.938           64QAM 0.828, 0.886, 0.938, 0.960         TPC           BPSK 5/16, 21/44, 3/4, 7/8         QPSK//0QPSK 5/16, 21/44, 3/4, 7/8, 0.93           Others         DVB-S: QPSK 1/2, 2/3, 3/4, 5/6           DVB-SC         QPSK//QPSK 5/0QPSK 1/2, 3/4, 7/8           QPSK/0QPSK 1/2, 3/4, 7/8         Yiterbi: BPSK/QDPSK 0/0QPSK 1/2, 3/4, 7/8  |                 |  |
| 64APSK 11/15, 7/9, 4/5, 5/6           DVB-S2X Low-<br>latency Mode         Very Short Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)           Paradise<br>proprietary<br>extension to<br>DVB-S2X         QPSK/8PSK/16APSK/32APSK 2/5,<br>7/15, 8/15, 3/5, 2/3, 11/15, 4/5,<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)           DVB-S2X         Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)           QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         QPSK 1/14, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           FastLink™         BPSK 0.499           Low-Latency<br>LDPC         QPSK/10QPSK 0.532, 0.639, 0.710,<br>0.798           BPSK 0.499         QPSK/10QPSK 0.532, 0.639, 0.710,<br>0.798           32APSK 0.778, 0.828, 0.886, 0.938<br>64QAM 0.828, 0.886, 0.938, 0.960           TPC         BPSK 5/16, 21/44, 3/4, 7/8<br>QPSK/0QPSK 5/16, 21/44, 3/4, 7/8,<br>0.93           BPSK 3/4, 7/8, 0.93         16QAM 3/4, 7/8, 0.93           Others         DVB-S: QPSK 1/2, 2/3, 3/4, 5/6<br>DVB-DSNG: 8PSK 2/3, 5/6, 8/9;<br>16QAM 3/4, 7/8           Others         DVB-SI QPSK 2/3<br>Sequential: BPSK/(O)QPSK 1/2, 3/4, 7/8           Viterbi: BPSK/QOPSK 0.0QPSK 1/2, 3/4, 7/8           Viterbi: BPSK/QOPSK 1/2, 3/4, 7/8           Reed-Solomon outer codec available  |                 |  |
| DVB-S2X Low-<br>latency Mode         Very Short Frame: (Frame size of<br>5,400 bits, reducing latency to 33% of<br>standard DVB-S2 Short frame)           Paradise<br>proprietary<br>extension to<br>DVB-S2X         QPSK/8PSK/16APSK/32APSK 2/5,<br>13/15, 14/15           Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)           QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         QPSK /16, 8/9, 9/10           DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           BPSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10         BPSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           IdAPSK Z/3, 3/4, 4/5, 5/6, 8/9, 9/10         BPSK 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           FastLink™         BPSK 0.499         DVB/SK/0QPSK 0.532, 0.639, 0.710, 0.778           Low-Latency<br>LDPC         ORSK/0QPSK 0.532, 0.639, 0.710, 0.778         I6APSK/16QAM 0.628, 0.886, 0.938, 0.860           32APSK 0.778, 0.828, 0.886, 0.938, 0.960         SZAPSK 0.778, 0.828, 0.886, 0.938, 0.960           TPC         BPSK 5/16, 21/44, 3/4, 7/8         OPSK/0QPSK 5/16, 21/44, 3/4, 7/8           0.93         BPSK 3/4, 7/8, 0.93         OAM 3/4, 7/8, 0.93         OAM 3/4, 7/8           Others         DVB-SSNG: 8PSK 2/3, 5/6, 8/9;<br>16QAM 3/4, 7/8         Oya, S/4, 5/6         D/9           Others         DVB-SNG: 8P  |                 |  |
| Paradise<br>proprietary<br>extension to<br>DVB-S2X         standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 2/5,<br>7/15, 8/15, 3/5, 2/3, 11/15, 4/5,<br>extension to<br>DVB-S2X           DVB-S2X         Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           FastLink™         BPSK 0.499<br>QPSK/0QPSK 0.532, 0.639, 0.710,<br>0.798           Low-Latency<br>LDPC         BPSK 0.499<br>QPSK/16QAM 0.639, 0.710, 0.778<br>16APSK/16QAM 0.726, 0.778, 0.828,<br>0.851           32APSK 0.778, 0.828, 0.886, 0.938<br>64QAM 0.828, 0.886, 0.938, 0.960           TPC         BPSK/16, 21/44, 3/4, 7/8,<br>0.93           DVB-S2         QPSK/QQPSK 5/16, 21/44, 3/4, 7/8,<br>0.93           Others         DVB-S: QPSK 1/2, 2/3, 3/4, 5/6<br>DVB-DSNG: 8PSK 2/3, 5/6, 8/9;<br>16QAM 3/4, 7/8           Others         DVB-S: QPSK 1/2, 1/3, 3/4, 5/6<br>DVB-DSNG: 8PSK 2/3, 5/6, 8/9;<br>16QAM 3/4, 7/8           Others         DVB-S: QPSK 1/2, 2/3, 3/4, 5/6<br>DVB-DSNG: 8PSK 2/3, 5/6, 8/9;<br>16QAM 3/4, 7/8           TCM: 8PSK 2/3<br>Sequential: BPSK/(0)QPSK 1/2, 3/4, 7/8           Reed-Solomon outer codec available  | DVB-S2X Low-    | Very Short Frame: (Frame size of       |
| Paradise<br>proprietary<br>extension to<br>DVB-S2X         QPSK/8PSK/16APSK/32APSK 2/5,<br>7/15, 8/15, 3/5, 2/3, 11/15, 4/5,<br>13/15, 14/15           DVB-S2X         Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         QPSK /14, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           BPSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10         8PSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10           FastLink™         BPSK 0.499           Low-Latency         QPSK/10QPSK 0.532, 0.639, 0.710,<br>0.798           BPSK 0.499         QPSK/10QPSK 0.532, 0.639, 0.710,<br>0.798           BPSK 0.499         QPSK/0QPSK 0.532, 0.639, 0.710,<br>0.798           BPSK 0.499         QPSK/16QAM 0.639, 0.710, 0.778,<br>0.851           32APSK 0.778, 0.828, 0.886, 0.938,<br>0.960           TPC         BPSK 5/16, 21/44, 3/4, 7/8<br>QPSK/0QPSK 5/16, 21/44, 3/4, 7/8,<br>0.93           BPSK 3/4, 7/8, 0.93         16QAM 3/4, 7/8, 0.93           Others         DVB-S: QPSK 1/2, 2/3, 3/4, 5/6<br>DVB-DSNG: 8PSK 2/3, 5/6, 8/9;<br>16QAM 3/4, 7/8           Viterbi: BPSK/QPSK/0QPSK 1/2, 3/4,<br>7/8         TCM: 8PSK 2/3<br>Sequential: BPSK/0QQPSK 1/2, 3/4,<br>7/8  | latency Mode    |  |
| extension to<br>DVB-S2X         13/15, 14/15           Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           BPSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10         16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           IdAPSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10         16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           IdAPSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10         16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           IdAPSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10         16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           Low-Latency<br>LDPC         BPSK 0.499         0PSK/0QPSK 0.532, 0.639, 0.710, 0.778           I6APSK/16QAM 0.639, 0.710, 0.778         16APSK/16QAM 0.726, 0.778, 0.828, 0.836           32APSK 0.778, 0.828, 0.886, 0.938         0.851           32APSK 0.778, 0.828, 0.886, 0.938         0.960           TPC         BPSK/16, 21/44, 3/4, 7/8           QPSK/0QPSK 5/16, 21/44, 3/4, 7/8, 0.93         16QAM 3/4, 7/8, 0.93           Others         DVB-S: QPSK 1/2, 2/3, 3/4, 5/6           DVB-SNG: 8PSK 2/3, 5/6, 8/9;<br>16QAM 3/4, 7/8         Viterbi: BPSK/QDPSK 1/2, 3/4, 7/8           Viterbi: BPSK/QDPSK 1/2, 3/4, 7/8         Sequential: BPSK/00QPSK 1/2, 3/4, 7/8           Reed-Solomon outer codec available         7/8   | Paradise        |  |
| DVB-S2X         Ultra Short Frame: (Frame size of<br>3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         QPSK /14, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           BPSK /16APSK/32APSK 1/3,<br>4/5, 5/6, 8/9, 9/10         BPSK /35, 2/3, 3/4, 5/6, 8/9, 9/10           IdAPSK /2/3, 3/4, 4/5, 5/6, 8/9, 9/10         BPSK /35, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           FastLink™         BPSK 0.499           Low-Latency         QPSK/10QPSK 0.532, 0.639, 0.710,<br>0.798           BPSK/36QAM 0.639, 0.710, 0.778, 0.828,<br>0.851         32APSK 0.778, 0.828, 0.886, 0.938,<br>64QAM 0.828, 0.886, 0.938, 0.960           TPC         BPSK 5/16, 21/44, 3/4, 7/8,<br>0.93         36QAM 0.478, 0.93           Others         DVB-S: QPSK 1/2, 2/3, 3/4, 5/6<br>DVB-SNG: 8PSK 2/3, 5/6, 8/9;<br>16QAM 3/4, 7/8, 0.93           Others         DVB-SNG: 8PSK 2/3, 5/6, 8/9;<br>16QAM 3/4, 7/8           Viterbi: BPSK/QPSK/OQPSK 1/2, 3/4, 7/8           Viterbi: BPSK/QPSK/0QPSK 1/2, 3/4, 7/8           Viterbi: BPSK/QDPSK 1/2, 3/4, 7/8           Sequential: BPSK/(0)QPSK 1/2, 3/4, 7/8           Reed-Solomon outer codec available  |                 |  |
| 3,240 bits, reducing latency to 20% of<br>standard DVB-S2 Short frame)<br>QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9,5/9,2/3,7/9,8/9           DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           BPSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10         8PSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10           IAPSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10         16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           FastLink™         BPSK 0.499           Low-Latency         0.798           DPC         0.798           8PSK/8QAM 0.639, 0.710, 0.778           16APSK/16QAM 0.726, 0.778, 0.828, 0.886, 0.938           64QAM 0.828, 0.886, 0.938, 0.960           TPC         BPSK 5/16, 21/44, 3/4, 7/8           QPSK/0QPSK 5/16, 21/44, 3/4, 7/8           0.93         8PSK 3/4, 7/8, 0.93           16QAM 3/4, 7/8, 0.93         16QAM 3/4, 7/8           Others         DVB-S: QPSK 1/2, 2/3, 3/4, 5/6           DVB-DSNG: 8PSK 2/3, 5/6, 8/9;<br>16QAM 3/4, 7/8         16QAM 3/4, 7/8           Viterbi: BPSK/QPSK/0QPSK 1/2, 3/4, 7/8         7/8           TCM: 8PSK 2/3         Sequential: BPSK/(0)QPSK 1/2, 3/4, 7/8           Reed-Solomon outer codec available         7/8   |                 |  |
| QPSK/8PSK/16APSK/32APSK 1/3,<br>4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4,<br>4/5, 5/6, 8/9, 9/10           BPSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10         8PSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10           Low-Latency<br>LDPC         BPSK 0.499           BPSK 0.499         0.710, 0.778           16APSK /16QAM 0.639, 0.710, 0.778         16APSK/16QAM 0.726, 0.778, 0.828, 0.851           32APSK 0.778, 0.828, 0.886, 0.938         64QAM 0.828, 0.886, 0.938, 0.960           TPC         BPSK 5/16, 21/44, 3/4, 7/8, 0.93           Others         DVB-S: QPSK 1/2, 2/3, 3/4, 5/6           DVB-SU QPSK 2/3, 5/6, 8/9; 16QAM 3/4, 7/8         Viterbi: BPSK/QQPSK 1/2, 3/4, 7/8           Viterbi: BPSK/QPSK/OQPSK 1/2, 3/4, 7/8         Viterbi: BPSK/QPSK/OQPSK 1/2, 3/4, 7/8           Reed-Solomon outer codec available         7/8  | _               | 3,240 bits, reducing latency to 20% of |
| 4/9, 5/9, 2/3, 7/9, 8/9           DVB-S2         QPSK 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           BPSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10         16APSK 2/3, 3/4, 5/6, 8/9, 9/10           FastLink™         BPSK 0.499           Low-Latency         QPSK/0QPSK 0.532, 0.639, 0.710, 0.798           BPSK/3/6, 2/8, 9/8         0.532, 0.639, 0.710, 0.778, 0.828, 0.851           32APSK 0.778, 0.828, 0.886, 0.938, 0.960         0.851           TPC         BPSK 5/16, 21/44, 3/4, 7/8           QPSK/0QPSK 5/16, 21/44, 3/4, 7/8, 0.93         16QAM 0.478, 0.93           Others         DVB-S: QPSK 1/2, 2/3, 3/4, 5/6           DVB-SNG: 8PSK 2/3, 5/6, 8/9; 16QAM 3/4, 7/8         Viterbi: BPSK/QPSK/0QPSK 1/2, 3/4, 7/8           Viterbi: BPSK/QPSK/0QPSK 1/2, 3/4, 7/8         Viterbi: BPSK/QPSK/0QPSK 1/2, 3/4, 7/8           Reed-Solomon outer codec available         7/8  |                 |  |
| 4/5, 5/6, 8/9, 9/10           8PSK 3/5, 2/3, 3/4, 4/5, 6, 8/9, 9/10           16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           FastLink™           Low-Latency           LDPC           9PSK 0.499           QPSK/OQPSK 0.532, 0.639, 0.710, 0.778           16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           8PSK 0.798           8PSK/8QAM 0.639, 0.710, 0.778           16APSK/16QAM 0.726, 0.778, 0.828, 0.828, 0.851           32APSK 0.778, 0.828, 0.886, 0.938           64QAM 0.828, 0.886, 0.938           64QAM 0.828, 0.886, 0.938           0.93           8PSK 5/16, 21/44, 3/4, 7/8, 0.93           16QAM 3/4, 7/8, 0.93           Others           DVB-S: QPSK 1/2, 2/3, 3/4, 5/6           DVB-SNG: 8PSK 2/3, 5/6, 8/9; 16QAM 3/4, 7/8           Viterbi: BPSK/QPSK/OQPSK 1/2, 3/4, 7/8           Viterbi: BPSK/QOPSK 1/2, 3/4, 7/8           Viterbi: BPSK/QOPSK 1/2, 3/4, 7/8           Reed-Solomon outer codec available   |                 |  |
| 8PSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10           16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           FastLink™         BPSK 0.499           Low-Latency         0.798           BPSK/8QAM 0.639, 0.710, 0.778         16APSK/16QAM 0.726, 0.778, 0.828, 0.851           32APSK 0.778, 0.828, 0.886, 0.938         64QAM 0.828, 0.886, 0.938, 0.960           TPC         BPSK/3/4, 7/8, 0.93         16QAM 3/4, 7/8, 0.93           Others         DVB-S: QPSK 1/2, 2/3, 3/4, 5/6         DVB-SNG: 8PSK 2/3, 5/6, 8/9; 16QAM 3/4, 7/8           Others         DVB-SK/QPSK 2/3         Sequential: BPSK/(O)QPSK 1/2, 3/4, 7/8           Reed-Solomon outer codec available  | DVB-S2          |  |
| 16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10           FastLink™         BPSK 0.499           Low-Latency         QPSK/0QPSK 0.532, 0.639, 0.710, 0.788           BPSK/30QPSK 0.532, 0.639, 0.710, 0.778         16APSK/16QAM 0.639, 0.710, 0.778, 0.828, 0.851           32APSK 0.778, 0.828, 0.886, 0.938         64QAM 0.828, 0.886, 0.938, 0.960           TPC         BPSK 5/16, 21/44, 3/4, 7/8           QPSK/0QPSK 5/16, 21/44, 3/4, 7/8, 0.93         16QAM 3/4, 7/8, 0.93           Others         DVB-S: QPSK 1/2, 2/3, 3/4, 5/6           DVB-DSNG: 8PSK 2/3, 5/6, 8/9; 16QAM 3/4, 7/8         Viterbi: BPSK/QPSK 1/2, 3/4, 7/8           Viterbi: BPSK/QOPSK 1/2, 3/4, 7/8         7/8           Reed-Solomon outer codec available         7/8   |                 |  |
| Low-Latency<br>LDPC         QPSK/0QPSK 0.532, 0.639, 0.710,<br>0.798           8PSK/8QAM 0.639, 0.710, 0.778         16APSK/16QAM 0.726, 0.778, 0.828,<br>0.851           32APSK 0.778, 0.828, 0.886, 0.938         64QAM 0.828, 0.886, 0.938, 0.960           TPC         BPSK 5/16, 21/44, 3/4, 7/8<br>0.93           BPSK 5/16, 21/44, 3/4, 7/8         0.93           Others         DVB-S: QPSK 1/2, 2/3, 3/4, 5/6<br>DVB-DSNG: 8PSK 2/3, 5/6, 8/9;<br>16QAM 3/4, 7/8           Viterbi: BPSK/QPSK/0QPSK 1/2, 3/4,<br>7/8         1/2, 3/4,<br>7/8           Reed-Solomon outer codec available   |                 | 16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10   |
| LDPC 0.798 8PSK/8QAM 0.639, 0.710, 0.778 16APSK/16QAM 0.726, 0.778, 0.828, 0.851 32APSK 0.778, 0.828, 0.886, 0.938 64QAM 0.828, 0.886, 0.938, 0.960 TPC BPSK 5/16, 21/44, 3/4, 7/8 QPSK/OQPSK 5/16, 21/44, 3/4, 7/8, 0.93 8PSK 3/4, 7/8, 0.93 Others DVB-S: QPSK 1/2, 2/3, 3/4, 5/6 DVB-DSNG: 8PSK 2/3, 5/6, 8/9; 16QAM 3/4, 7/8 Viterbi: BPSK/QPSK 1/2, 3/4, 7/8 Viterbi: BPSK/QPSK 1/2, 3/4, 7/8 TCM: 8PSK 2/3 Sequential: BPSK/(O)QPSK 1/2, 3/4, 7/8 Reed-Solomon outer codec available   |                 |  |
| 16APSK/16QAM 0.726, 0.778, 0.828, 0.851           32APSK 0.778, 0.828, 0.886, 0.938           64QAM 0.828, 0.886, 0.938, 0.960           TPC         BPSK 5/16, 21/44, 3/4, 7/8           QPSK/0QPSK 5/16, 21/44, 3/4, 7/8, 0.93           8PSK 3/4, 7/8, 0.93           16QAM 3/4, 7/8, 0.93           16QAM 3/4, 7/8, 0.93           Others           DVB-S: QPSK 1/2, 2/3, 3/4, 5/6           DVB-DSNG: 8PSK 2/3, 5/6, 8/9; 16QAM 3/4, 7/8           Viterbi: BPSK/0QPSK 1/2, 3/4, 7/8           Viterbi: BPSK/0QPSK 1/2, 3/4, 7/8           FCM: 8PSK 2/3           Sequential: BPSK/(0)QPSK 1/2, 3/4, 7/8           Reed-Solomon outer codec available  |                 |  |
| 0.851           32APSK 0.778, 0.828, 0.886, 0.938           64QAM 0.828, 0.886, 0.938, 0.960           TPC         BPSK 5/16, 21/44, 3/4, 7/8           QPSK/OQPSK 5/16, 21/44, 3/4, 7/8, 0.93           16QAM 3/4, 7/8, 0.93           16QAM 3/4, 7/8, 0.93           Others           DVB-S: QPSK 1/2, 2/3, 3/4, 5/6           DVB-SNG: 8PSK 2/3, 5/6, 8/9; 16QAM 3/4, 7/8           Viterbi: BPSK/QPSK/OQPSK 1/2, 3/4, 7/8           Viterbi: BPSK/QPSK/OQPSK 1/2, 3/4, 7/8           FCM: 8PSK 2/3           Sequential: BPSK/(0)QPSK 1/2, 3/4, 7/8           Reed-Solomon outer codec available   |                 |  |
| 32APSK 0.778, 0.828, 0.886, 0.938           64QAM 0.828, 0.886, 0.938, 0.960           TPC         BPSK 5/16, 21/44, 3/4, 7/8           QPSK/0QPSK 5/16, 21/44, 3/4, 7/8, 0.93           8PSK 3/4, 7/8, 0.93           16QAM 3/4, 7/8, 0.93           Others         DVB-S: QPSK 1/2, 2/3, 3/4, 5/6           DVB-DSNG: 8PSK 2/3, 5/6, 8/9; 16QAM 3/4, 7/8           Viterbi: BPSK/QPSK/OQPSK 1/2, 3/4, 7/8           Viterbi: BPSK/QPSK/0QPSK 1/2, 3/4, 7/8           FCM: 8PSK 2/3           Sequential: BPSK/(0)QPSK 1/2, 3/4, 7/8           Reed-Solomon outer codec available   |                 |  |
| TPC         BPSK 5/16, 21/44, 3/4, 7/8           QPSK/OQPSK 5/16, 21/44, 3/4, 7/8, 0.93         0.93           8PSK 3/4, 7/8, 0.93         16QAM 3/4, 7/8, 0.93           16QAM 3/4, 7/8, 0.93         0.93           Others         DVB-S: QPSK 1/2, 2/3, 3/4, 5/6           DVB-DSNG: 8PSK 2/3, 5/6, 8/9;         16QAM 3/4, 7/8           Viterbi: BPSK/QPSK/OQPSK 1/2, 3/4, 7/8         7/8           TCM: 8PSK 2/3         Sequential: BPSK/(O)QPSK 1/2, 3/4, 7/8           Reed-Solomon outer codec available         7/8  |                 |  |
| QPSK/OQPSK 5/16, 21/44, 3/4, 7/8, 0.93           8PSK 3/4, 7/8, 0.93           16QAM 3/4, 7/8, 0.93           Others           DVB-S: QPSK 1/2, 2/3, 3/4, 5/6           DVB-DSNG: 8PSK 2/3, 5/6, 8/9; 16QAM 3/4, 7/8           Viterbi: BPSK/QPSK/OQPSK 1/2, 3/4, 7/8           TCM: 8PSK 2/3           Sequential: BPSK/(O)QPSK 1/2, 3/4, 7/8           Reed-Solomon outer codec available  | TPC             |  |
| 8PSK 3/4, 7/8, 0.93           16QAM 3/4, 7/8, 0.93           Others         DVB-S: QPSK 1/2, 2/3, 3/4, 5/6           DVB-DSNG: 8PSK 2/3, 5/6, 8/9;           16QAM 3/4, 7/8           Viterbi: BPSK/QPSK/OQPSK 1/2, 3/4, 7/8           TCM: 8PSK 2/3           Sequential: BPSK/(O)QPSK 1/2, 3/4, 7/8           Reed-Solomon outer codec available   |                 | QPSK/OQPSK 5/16, 21/44, 3/4, 7/8,      |
| 16QAM 3/4, 7/8, 0.93           Others         DVB-S: QPSK 1/2, 2/3, 3/4, 5/6           DVB-DSNG: 8PSK 2/3, 5/6, 8/9;<br>16QAM 3/4, 7/8         Viterbi: BPSK/QPSK 1/2, 3/4,<br>7/8           TCM: 8PSK 2/3         Sequential: BPSK/(O)QPSK 1/2, 3/4,<br>7/8           Reed-Solomon outer codec available  |                 |  |
| DVB-DSNG: 8PSK 2/3, 5/6, 8/9;<br>16QAM 3/4, 7/8<br>Viterbi: BPSK/QPSK/OQPSK 1/2, 3/4,<br>7/8<br>TCM: 8PSK 2/3<br>Sequential: BPSK/(O)QPSK 1/2, 3/4,<br>7/8<br>Reed-Solomon outer codec available   |                 |  |
| 16QAM 3/4, 7/8<br>Viterbi: BPSK/QPSK/OQPSK 1/2, 3/4,<br>7/8<br>TCM: 8PSK 2/3<br>Sequential: BPSK/(O)QPSK 1/2, 3/4,<br>7/8<br>Reed-Solomon outer codec available  | Others          |  |
| Viterbi: BPSK/QPSK/OQPSK 1/2, 3/4,<br>7/8<br>TCM: 8PSK 2/3<br>Sequential: BPSK/(O)QPSK 1/2, 3/4,<br>7/8<br>Reed-Solomon outer codec available  |                 |  |
| TCM: 8PSK 2/3<br>Sequential: BPSK/(O)QPSK 1/2, 3/4,<br>7/8<br>Reed-Solomon outer codec available   |                 | Viterbi: BPSK/QPSK/OQPSK 1/2, 3/4,     |
| Sequential: BPSK/(O)QPSK 1/2, 3/4,<br>7/8<br>Reed-Solomon outer codec available  |                 |  |
| Reed-Solomon outer codec available   |                 | Sequential: BPSK/(O)QPSK 1/2, 3/4,     |
|  |                 |  |
|  |                 |  |



# TELEDYNE PARADISE DATACOM

|                                       | A Teledyne Technologies Company   |
|---------------------------------------|---|
| Ethernet:                             | Standard Features   |
| Bridging and Static Routing           | Trunking mode: Hardware Layer 2<br>bridge supporting 155Mbps bi-<br>directional traffic (at up to 500,000<br>packets per second); zero jitter   |
|                                       | Layer 2 bridge & Layer 3 router:<br>Software processing capability of<br>up to 150,000 packets per second   |
| IPv4/IPv6                             | Dual IPV4/IPV6 TCP/IP supporting<br>IPv4 and IPv6 bridging and routing  |
| VLAN Support                          | IEEE 802.1q VLAN support<br>IEEE 802.1p Quality of Service<br>(packet prioritisation) using strict  |
| DHCP, SNMP                            | priority or fair weighting queuing<br>DHCP for automatic allocation of<br>M&C IP address. SNMP v1, v2c & v3   |
| Web Server                            | Modem web server M&C interface  |
| IP Diagnostic                         | Shows Tx, Rx throughput (bps, pps);   |
| Graphs<br>TCP/IP                      | dropped, errored packet counts<br>Generates & analyses TCP & UDP  |
| Packet<br>Generator/<br>Analyser      | packet streams, allowing modem-to-<br>modem IP testing without any other<br>test equipment  |
| Ethernet MTU<br>Size                  | Standard: 10k bytes<br>Optical Ethernet: 16k bytes  |
| Ethernet:                             | XStream IP™ Option  |
| and traffic mana<br>mum reliability a | an integrated set of IP optimization<br>agement features designed for maxi-<br>and bandwidth efficiency. The maxi-<br>t depends on features & traffic format  |
| Traffic<br>Shaping                    | Provides guaranteed throughput for<br>priority traffic, using Committed and<br>Burst Information Rates. Stream<br>differentiation is by IP address, IEEE<br>802.1p priority, Diffserv DSCP, PID,<br>VLAN ID or MPLS EXP   |
| Header<br>Compression                 | Robust Header Compression (RFC<br>3095). Reduces Ethernet/IP/UDP/<br>TCP/RTP header sizes typically by<br>90%. 1-way packet processing limit:<br>60,000 pps; 2-way limit: 45,000 pps.<br>Includes Ethernet header compres-<br>sion (compresses 14-byte Ethernet |
| Payload<br>Compression                | frame to typically one byte)<br>Uses Deflate algorithm (RFC 1951)<br>to compress TCP & UDP packets;<br>typical payload compression of 50%   |
| Dynamic<br>Routing                    | RIP V1, V2; OSPF V2, V3; BGP V4   |
| TCP<br>Acceleration                   | Typical throughput level of 90% of<br>link capacity. Supports 10,000 con-<br>current accelerated TCP connections<br>(plus at least 40,000 unaccelerated<br>TCP connections) up to 100Mbps   |
| AAA RADIUS<br>Secure User<br>Login    | Authentication, Authorisation & Ac-<br>counting. Greater access control &<br>accountability. Replaces standard<br>modem login with user's personal<br>company network login credentials   |
| AES-256<br>Encryption                 | Encrypts all IP traffic using AES with 256-bit keys   |
| Ethernet:                             | XStream IP™ DVB-S2  |
|                                       | ndard as part of DVB-S2 & DVB-S2X   |
| ACM                                   | Dynamically varies modcod with<br>varying link conditions, maximises<br>throughput at all times by converting<br>unused link margin into additional<br>throughput; 100% link availability   |
| VCM                                   | Supports transmission/reception of<br>two ASI streams or, one ASI stream<br>with one IP stream, each with its own<br>modcod for optimal throughput  |
| IP-over-<br>DVB<br>Encapsulation      | Supports the transmission of IP<br>packets with/without Ethernet frames<br>over DVB-S2; encapsulates & de-<br>capsulates using MPE (EN 301 192),<br>ULE (RFC 4326) or Paradise PXE  |

## Q-FlexE<sup>™</sup>



#### **Dual IF/L-Band Satellite Modem**

| Paired Carr  | Paired Carrier <sup>™</sup> Option   |  |  |  |  |  |
|--|--|--|--|--|--|--|
| Paired Carrier™  | Transmit and receive carriers are<br>overlaid in the same space segment.<br>Echo cancellation techniques are used<br>to cancel the unwanted transmit carrier<br>leaving the wanted receive carrier |  |  |  |  |  |
| Paired Carrier™<br>data rate<br>options<br>(30kHz to<br>54MHz occu-<br>pied bandwidth)<br>Power<br>asymmetry | 256kbps, 512kbps, 1024kbps,<br>2.5Mbps, 5Mbps, 10Mbps, 15Mbps,<br>20Mbps, 25Mbps, 30Mbps, 40Mbps,<br>50Mbps, 60Mbps, 80Mbps, 100Mbps<br>and 155Mbps traffic rate<br>-10dB to +10dB                 |  |  |  |  |  |
| Symbol rate<br>asymmetry   | Up to 12:1   |  |  |  |  |  |
| Eb/No<br>degradation   | Typically < 0.5dB<br>(0.7dB for 16QAM/16APSK with 10dB<br>power asymmetry; 1dB or more for<br>32APSK and higher)   |  |  |  |  |  |
| Mobile<br>Operation  | Uses GPS data to continually<br>recalculate position relative to satellite,<br>allowing uninterrupted operation in<br>mobile environments anywhere in<br>satellite footprint                       |  |  |  |  |  |
| ClearLinQ™   | Adaptive Tx Predistorter   |  |  |  |  |  |

#### Option Corrects for linear & non-linear distortion in the RF chain (i.e. amplifier and transponder). Applicable to all FECs

and modulations (including DVB-S2X, DVB-S2, TPC & FastLink™). Maximises amplifier output power and minimises required back-off. Up to 2dB performance gain

#### **DVB Carrier ID Option (ETSI TS 103 129)**

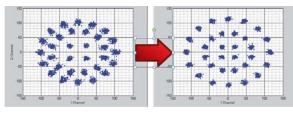
Supports the identification of interfering carriers. Allows identification of individual modem carriers by superimposing a low-power CID waveform onto the carrier with negligible degradation. The CID waveform contains a unique Carrier ID and other identity information. A carrier monitoring system is required to decode CID waveforms. The DVB Carrier ID option is available as a software upgrade for all Q-Series modems

#### **TPC Performance**

| Eb/No (dB) at BER 5E-8 |             |             |             |              |  |  |  |  |
|------------------------|-------------|-------------|-------------|--------------|--|--|--|--|
|                        | Rate<br>1/2 | Rate<br>3/4 | Rate<br>7/8 | Rate<br>0.93 |  |  |  |  |
| BPSK, (O)QPSK          | 3.0         | 4.2         | 4.2         | 6.5          |  |  |  |  |
| 8PSK                   |             | 6.3         | 6.8         | 9.6          |  |  |  |  |
| 16QAM                  |             | 7.6         | 7.9         | 10.4         |  |  |  |  |

### **DVB-S/DSNG Performance**

| Eb/No (dB) at QEF* |             |             |             |             |             |             |  |  |
|--------------------|-------------|-------------|-------------|-------------|-------------|-------------|--|--|
|                    | Rate<br>1/2 | Rate<br>2/3 | Rate<br>3/4 | Rate<br>5/6 | Rate<br>7/8 | Rate<br>8/9 |  |  |
| QPSK               | 3.9         | 4.6         | 4.0         | 4.6         | 5.3         |             |  |  |
| 8PSK               |             | 6.9         |             | 8.9         |             | 9.4         |  |  |
| 160AM              |             |             | 9.0         |             | 10.7        |             |  |  |



'Before and after' constellations showing ClearLinQ™ Adaptive Tx Pre-distorter compensating for severe non-linear signal distortion to a 32APSK carrier

|   | FastLi  | nk™      | Performa   | ince       |             | T  |
|---|---------|----------|------------|------------|-------------|----|
|   | Eb/No ( | dB) at I | BER 5E-8   |            |             | В  |
|   |         |          | Low BER    | Balanced   | Low Latency |    |
|   | BPSK    | 0.499    | 2.1        | 2.9        | 3.4         |    |
| _ | (O)QPSK | 0.532    | 2.2        | 2.6        | 2.9         |    |
|   | (O)QPSK | 0.639    | 2.4        | 2.8        | 3.2         | С  |
|   | (O)QPSK | 0.710    | 2.7        | 3.3        | 3.7         | m  |
|   | (O)QPSK | 0.798    | 3.3        | 3.9        | 4.4         |    |
|   | 8PSK    | 0.639    | 5.9 (QEF*) | 6.2 (QEF*) | 6.7 (QEF*)  |    |
| _ | 8PSK    | 0.710    | 5.9 (QEF*) | 5.5        | 5.9         | A  |
|   | 8PSK    | 0.778    | 5.7        | 6.1        | 6.6         |    |
|   | 8QAM    | 0.639    | 4.5        | 4.8        | 5.1         | Ν  |
| _ | 8QAM    | 0.710    | 5          | 5.4        | 5.7         | S  |
|   | 8QAM    | 0.778    | 5.6        | 5.9        | 6.3         |    |
|   | 16APSK  | 0.726    | 7.2 (QEF*) | 7.7 (QEF*) | 8.1 (QEF*)  | ۷  |
| _ | 16APSK  | 0.778    | 7.4 (QEF*) | 7.9 (QEF*) | 8.3 (QEF*)  | P  |
|   | 16APSK  | 0.828    | 7.7        | 8.2        | 8.5         | Ĭ  |
|   | 16APSK  | 0.851    | 8          | 8.5        | 8.9         |    |
|   | 16QAM   | 0.726    | 7.6 (QEF*) | 7.5        | 7.7         | S  |
|   | 16QAM   | 0.778    | 7          | 7.6        | 7.9         | S  |
|   | 16QAM   | 0.828    | 7.5        | 8.0        | 8.2         | E  |
|   | 16QAM   | 0.851    | 7.8        | 8.2        | 8.6         | lr |
|   | 32APSK  | 0.778    | 9.4        | 9.9        | 10.3        | C  |
|   | 32APSK  | 0.828    | 10.1       | 10.7       | 11.2        | Т  |
|   | 32APSK  | 0.886    | 11.1       | 11.6       | 12.2        |    |
|   | 32APSK  | 0.938    | 12.9       | 13.5       | 14.3        | Н  |

| <b>Test Facil</b>            | ities and Alarm Outputs  |
|------------------------------|--|
| BER Tester                   | Bit error rate tester operates over<br>main traffic, ESC or Aux channels,<br>allowing BER monitoring while on<br>traffic. Not available in DVB-S2 mode<br>Supports various test patterns com-<br>patible with common BER testers |
| Other test<br>modes          | Transmit CW (pure carrier)<br>Transmit alternate 1-0 pattern<br>Simulated satellite delay for TCP/IP<br>packets  |
| Alarm Relays                 | 4 Independent Form C relays for unit,<br>Tx, Rx and backward alarms  |
| Mechanic                     | al/Environmental   |
| Size                         | 1U chassis, 410mm deep excluding<br>front panel handles and rear panel<br>connectors and fans  |
| Weight                       | 3.5kg  |
| Power<br>Supply              | 90 to 264VAC, 1A @100V, 0.5A @<br>240V, 47 to 63Hz<br>Fused IEC connector (live and neutral<br>fused); 24V and 48V DC options  |
| Compliances                  | FCC, CE and RoHS compliant   |
| Safety<br>Standards          | EN60950-1:2006   |
| Emissions<br>and<br>Immunity | Emissions: EN55022:2006 Class B<br>Immunity: EN55024:1998 (+ A1:2001<br>+ A2:2003  |
| Operating<br>Temperature     | Standard: 0 to 50°C (storage: -40°C<br>to 70°C)<br>Extended: 0 to 55°C when fitted with<br>Ruggedisation option  |
| Humidity                     | 95% relative humidity, non-<br>condensing  |

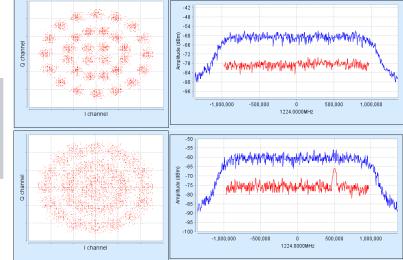
#### DVB-S2 Performance (for DVB-S2X performance, see separate datasheet) E

| Eb/No (d | Eb/No (dB) for Normal (64k) frames at QEF* (Es/No in brackets) |             |             |             |             |             |             |             |             |             |              |
|----------|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
|          | Rate<br>1/4  | Rate<br>1/3 | Rate<br>2/5 | Rate<br>1/2 | Rate<br>3/5 | Rate<br>2/3 | Rate<br>3/4 | Rate<br>4/5 | Rate<br>5/6 | Rate<br>8/9 | Rate<br>9/10 |
| QPSK     | 1.5 (-1.6)   | 1.1 (-0.7)  | 1.3 (0.3)   | 1.5 (1.5)   | 2.0 (2.8)   | 2.2 (3.4)   | 2.6 (4.3)   | 3.0 (5.0)   | 3.3 (5.5)   | 4.0 (6.5)   | 4.2 (6.7)    |
| 8PSK     |  |             |             |             | 3.8 (6.3)   | 4.1 (7.1)   | 4.9 (8.4)   |             | 5.8 (9.7)   | 6.8 (11.0)  | 7.0 (11.3)   |
| 16APSK   |  |             |             |             |             | 5.4 (9.6)   | 6.0 (10.7)  | 6.5 (11.5)  | 6.8 (12.0)  | 7.7 (13.2)  | 7.9 (13.4)   |

\* Note: QEF is defined as a BER of 5E-12 (this is equivalent to a PER of approximately 5E-9).

In relation to FastLink<sup>™</sup>, the QEF point is used for modcods where there is no discernible gradation in BER performance (i.e. once the demodulator has locked then the modem will operate at the QEF point only).

Note for operation with DVB-S2 Short (16k) frames, an Eb/No increase of 0.3dB is required (worst case) with respect to the corresponding modcod for Normal frame performance.



Built-in Spectrum Analyser showing LinkGuard<sup>TM</sup> Signal-Under-Carrier interference detection without/with interferer present.

## **Q-FlexE**<sup>™</sup>



#### Dual IF/L-Band Satellite Modem

|   | Option | Description Fully configurable - pay only for what you need!   |
|---|--------|--|
| Base Modem  | ~      | <ul> <li>4.8kbps to 2.048Mbps Closed Network (+ ESC) modem with two Ethernet 10/100/1000 BaseT RJ45s for M&amp;C and traffic respectively; Ethernet bridge, static routing; IPv4/IPv6; IEEE 802.1p QoS; IEEE 802.1q VLAN; 10k bytes MTU IF operation 950 to 2050MHz; high-stability 10MHz reference; FSK</li> <li>TPC: BPSK, QPSK, QPSK, 8PSK and 16QAM; to 60Mbps subject to prevailing modem data rate LinkGuard<sup>™</sup>: Signal-under-carrier interference detection web spectrum graph showing received spectrum and any interference underneath the received carrier while on traffic; automated alarm when interference rises above user-set threshold; supported for FastLink<sup>™</sup>, TPC and DVB-S2X for all modulations</li> <li>AUPC: Automatic Uplink Power Control</li> <li>Web browser monitoring tools: Spectrum display, constellation monitor, TCP/IP throughput Internal Bit Error Rate Tester (BERT): For non-DVB-S2/DVB-S2X operation only</li> <li>TCP/IP Packet Generator/Analyser: Generates and analyses TCP and UDP packet streams, allowing modem-to-modem IP testing without the need for any other test equipment</li> </ul> |
| Tx-only   |        | Transmit functions only  |
| Rx-only   |        | Receive functions only   |
| Data Rate   |        | 5Mbps data rate: Extends base operation to 5Mbps   |
|   |        | 10Mbps data rate: Extends 5Mbps operation to 10Mbps  |
|   |        | 25Mbps data rate: Extends 10Mbps operation to 25Mbps   |
|   |        | 60Mbps data rate: Extends 25Mbps operation to 60Mbps   |
|   |        | 100Mbps data rate: Extends 60Mbps operation to 100Mbps (FastLink™, DVB-S2 & DVB-S2X only)  |
|   |        | 155.52Mbps data rate: Extends 100Mbps operation to 155.52Mbps (DVB-S2 & DVB-S2X only)  |
| XStream IP™   |        | Traffic Shaping: Supports CIR/BIR/priority settings for IP streams classified by IP address, Diffserv class, IEEE 802.1p priority tag, MPLS EXP field, VLAN ID and MPEG2 transport stream PID  |
|   |        | Header Compression: IP/UDP/TCP/RTP packet header compression (RFC 3095) plus Ethernet header compression   |
|   |        | Payload Compression: TCP/UDP packet payload compression using the Deflate algorithm (RFC 1951)   |
|   |        | Dynamic Routing: RIP, OSPF and BGP   |
|   |        | TCP Acceleration: Up to 10,000 concurrent accelerated TCP connections to 100Mbps subject to prevailing data rate   |
|   |        | AAA RADIUS Secure User Login: Authentication, Authorisation & Accounting. Greater access control & accountability. Replaces standard modem login with user's personal company network login credentials  |
|   |        | Encryption: TCP/IP packet payload encryption using AES with 256-bit keys   |
| XStream IP™ DVB<br>-S2  |        | <b>IP-over-DVB Encapsulation:</b> Encapsulation of IP packets and Ethernet frames over DVB-S2 using Paradise XStream Protocol (PXE), MPE or ULE  |
| Provided as stand-<br>ard as part of DVB-                             |        | ACM: DVB-S2/DVB-S2X ACM  |
| S2 & DVB-S2X<br>options   |        | VCM: Allows either two ASI streams, or one ASI stream and one IP stream, to be multiplexed onto a single carrier; re-<br>quires Quad ASI hardware option   |
| <b>DVB-S2X</b><br>To 155Mbps sub-<br>ject to prevailing               |        | <b>DVB-S2X CCM Tx:</b> DVB-S2 QPSK, 8PSK, 16APSK & 32APSK Tx operation per EN 302 307-1. DVB-S2X QPSK, 8PSK, 16APSK, 32APSK & 64APSK Tx operation per EN 302 307-2. Includes 5%, 10%, 15%, 20%, 25% & 35% spectral roll-offs. Includes XStream IP <sup>™</sup> DVB-S2, which comprises ACM, VCM and IP-over-DVB encapsulation  |
| modem data rate<br>limits   |        | DVB-S2X CCM Rx: Add-on card (P3609) supporting DVB-S2 QPSK, 8PSK, 16APSK & 32APSK Rx operation per EN 302 307-1. DVB-S2X QPSK, 8PSK, 16APSK, 32APSK & 64APSK Rx operation per EN 302 307-2. Includes 5%, 10%, 15%, 20%, 25% & 35% spectral roll-offs. Includes XStream IP™ DVB-S2, which comprises ACM, VCM and IP-over-DVB decapsulation  |
| DVB-S2<br>Low-cost DVB-S2   |        | <b>DVB-S2 CCM Tx:</b> DVB-S2 QPSK, 8PSK & 16APSK Tx operation per EN 302 307-1. Includes 15%, 20%, 25% & 35% spectral roll-offs. Includes XStream IP <sup>™</sup> DVB-S2, which comprises ACM, VCM and IP-over-DVB encapsulation   |
| option; to 155Mbps<br>subject to modem<br>data rate limits            |        | <b>DVB-S2 CCM Rx:</b> Add-on card (P3604) supporting DVB-S2 QPSK, 8PSK & 16APSK Rx operation per EN 302 307-1. Includes 15%, 20%, 25% & 35% spectral roll-offs. Includes XStream IP <sup>™</sup> DVB-S2, which comprises ACM, VCM and IP-over-DVB decapsulation. <i>Please note that this add-on card is physically different to the DVB-S2X add-on card</i> !   |
| DVB-S2X Low-<br>latency Mode<br>Proprietary exten-<br>sion to DVB-S2X |        | <ul> <li>Very Short Frame: Frame size of 5,400 bits, reducing latency to 33% of standard DVB-S2 Short frame; supports QPSK/8PSK/16APSK/32APSK 2/5, 7/15, 8/15, 3/5, 2/3, 11/15, 4/5, 13/15, 14/15</li> <li>Ultra Short Frame: Frame size of 3,240 bits, reducing latency to 20% of standard DVB-S2 Short frame; supports QPSK/8PSK/16APSK/32APSK 1/3, 4/9, 5/9, 2/3, 7/9, 8/9</li> </ul>   |
| ClearLinQ <sup>™</sup> Adaptive Tx Predistorter                       |        | Corrects for linear & non-linear distortion in the RF chain. Applicable to all FECs and modulations including DVB-S2X, DVB-S2, FastLink™ & TPC   |
| FastLink™<br>Low-latency LDPC   |        | Add-on card (P3605); includes BPSK, QPSK, OQPSK, 8PSK, 8QAM, 16APSK, 16QAM, 32APSK & 64QAM; to 100Mbps subject to prevailing modem data rate limits  |
|   |        |  |



Configuration options continue on next page.

## **Q-FlexE**<sup>™</sup> **Dual IF/L-Band Satellite Modem**



|  | Option | Description Fully configurable - pay only for what you need!  |
|--|--------|---|
| Paired Carrier™  |        | Paired Carrier™ add-on card P3607 (requires one or more options below)  |
| Subject to prevailing mo-                                |        | Paired Carrier™ up to <b>256kbps</b> (requires Paired Carrier™ add-on card)   |
| dem data rate limits.                                    |        | Extends Paired Carrier™ up to <b>512kbps</b>  |
| Occupied bandwidth:                                      |        | Extends Paired Carrier™ up to <b>1.024Mbps</b>  |
| minimum 30kHz; maxi-                                     |        | Extends Paired Carrier™ up to 2.5Mbps   |
| mum 54MHz  |        | Extends Paired Carrier™ up to 5Mbps   |
|  |        | Extends Paired Carrier™ up to 10Mbps  |
|  |        |   |
|  |        | Extends Paired Carrier™ up to 15Mbps  |
|  |        | Extends Paired Carrier™ up to 20Mbps  |
|  |        | Extends Paired Carrier™ up to 25Mbps  |
|  |        | Extends Paired Carrier™ up to 30Mbps  |
| Note that Paired Carrier™                                |        | Extends Paired Carrier™ up to <b>40Mbps</b>   |
| is also available as a low-                              |        | Extends Paired Carrier™ up to <b>50Mbps</b>   |
| cost 90-day per annum<br>license for redundancy          |        | Extends Paired Carrier™ up to <b>60Mbps</b>   |
| system standby modems                                    |        | Extends Paired Carrier™ up to 80Mbps  |
| <ul> <li>please contact Sales for<br/>details</li> </ul> |        | Extends Paired Carrier™ up to 100Mbps   |
|  |        | Extends Paired Carrier™ up to 155.52Mbps  |
| Terrestrial Interfaces<br>(Please choose up to four      | -      | 4-port Gigabit Ethernet Switch: Extends base modem Ethernet traffic port with 3 Ethernet ports, creating 4-port switch  |
| hardware options)  |        | <b>Optical Gigabit Ethernet/STM-1/OC-3:</b> Small Form-factor Pluggable module; supports single-mode & multi-mode fibre & all wavelengths; supports all standard fibre connector types such as SC & LC (subject to provision of suitable mating socket for SFP cage)  |
|  |        | <b>G.703:</b> Provides unbalanced G.703 on 2xBNC 75Ω sockets and balanced G.703 on RJ45; includes G.703 clock extension, which provides a high-stability reference clock over satellite (alternative to GPS); includes Drop & Insert; supports E1, T1, E2, T2, E3 & T3  |
|  |        | EIA-530: D25 DCE supporting RS422/X.21/V.35/RS232   |
|  |        | Quad E1: Balanced G.703 on 4xRJ45; all four ports support Drop & Insert and are enabled as standard; IBS satellite framing enabled as standard; MultiMux enabled as standard, which allows IP and/or EIA530 traffic, if EIA530 interface fitted, in place of one or two Quad E1 ports (each MultiMux port is limited to 2.048Mbps traffic rate) |
|  |        | Quad ASI: $4xBNC 75\Omega$ sockets; includes DVB-S/DSNG FEC (which can be used with all terrestrial interfaces)   |
|  |        | Serial LVDS: On 25-way D-type connector   |
|  |        | HSSI: On HD50 50-way SCSI-2 connector   |
|  |        | <b>IDR:</b> To IESS-308; 50-way female D-type connector; includes Advanced AUX (variable rate synchronous Aux channel; includes option to replace IDR audio channels with serial data); includes Audio option (for IBS carriers this allows 2 x audio in 64kbps or 2 x audio+64kbps data in 128kbps - requires IBS option)                      |
| Optimised Spectral<br>Roll-off                           |        | Extends the standard 35%, 25% and 20% roll-off factors to include 5%, 10% and 15% roll-offs for FastLink™, TPC & legacy FECs including DVB-S  |
| Ruggedisation  |        | Ruggedises the modem for harsh environments (fans with higher airflow, heatsinks on key components, etc.)   |
| Wideband   |        | Extends L-band operation upper frequency limit from 2050MHz to 2150MHz  |
| DVB-CID  |        | DVB Carrier ID: Tx carrier identification per ETSI 103 129  |
| Packet Synchronisation                                   |        | Supports IEEE 1588 Precision Time Protocol Version 2  |
| IBS  |        | Satellite framing to IESS 309 with low-rate Intelsat ESC (to IESS 403) and high-rate IBS ESC  |
| Legacy FEC   |        | Sequential FEC (limited to 2.048Mbps); TCM 8PSK 2/3 to IESS 310; Viterbi BPSK/QPSK/OQPSK FEC rates 1/2, 3/4 & 7/8; Intelsat Reed-Solomon outer codec  |
| 24V DC Input   |        | K3023 24V DC primary power input (in place of 100 to 240V AC input); DC input attaches via a screw-terminal connect-<br>or plate  |
| 48V DC Input   |        | K3018 48V DC primary power input (in place of 100 to 240V AC input); DC input attaches via a screw-terminal connect-<br>or plate  |
| 24V 200W BUC PSU   |        | P3543 AC input, 24V 200W DC to Tx BUC   |
| 48V 200W BUC PSU   | L      | P3544 AC input, 48V 200W DC to Tx BUC   |
| 48V In & 24V BUC PSU                                     |        | P3545 Floating 48V DC input; +24V 200W DC to Tx BUC; DC input attaches via a screw-terminal connector plate   |
| 48V In & 48V BUC PSU                                     |        | P3546 Floating 48V DC input; +48V 200W DC to Tx BUC; DC input attaches via a screw-terminal connector plate   |
| +48V In & 48V BUC PSU                                    |        | P3547 +48V DC input; +48V 200W DC to Tx BUC; DC input attaches via a screw-terminal connector plate   |

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